November, 1949

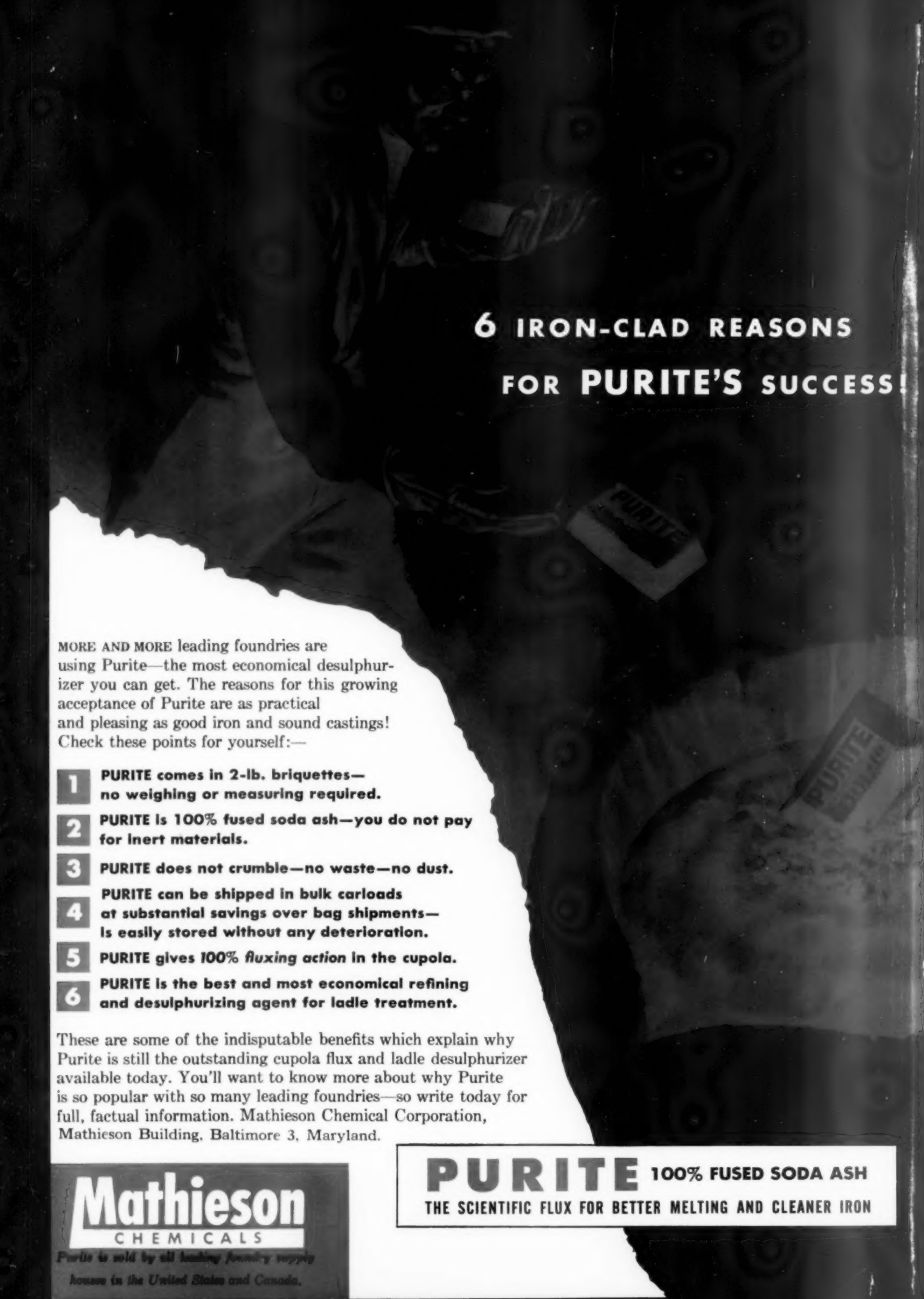
THE FOUNDRY

wherever metals are cast...

A MODERN* Truss-Type, Swivel Cupola Charger installed at Production Foundries Division, Jackson Industries, Inc., Birmingham, Ala., for Dual Cupola Service. Weigh hopper, located in crane-serviced storage yard, is 72 feet from center line of cupolas.
New MODERN* Square-Top, Small-Cone Type Side Discharge Cupola Charging Bucket.
Sill of Cupola Charging Door 28 feet above ground. Center line of Cupola 72' from Weigh Hopper.
Inclined Charger Rails are supported by Truss-Type, bridge-like structure.
Weigh Hopper, mounted in scale, in which charge is made up, is loaded by crane in storage yard.

MODERN EQUIPMENT CO.
PORT WASHINGTON, WISCONSIN

TURN TO PAGE FACING INSIDE BACK COVER



6 IRON-CLAD REASONS FOR PURITE'S SUCCESS!

MORE AND MORE leading foundries are using Purite—the most economical desulphurizer you can get. The reasons for this growing acceptance of Purite are as practical and pleasing as good iron and sound castings! Check these points for yourself:—

1. **PURITE comes in 2-lb. briquettes—no weighing or measuring required.**
2. **PURITE is 100% fused soda ash—you do not pay for inert materials.**
3. **PURITE does not crumble—no waste—no dust.**
4. **PURITE can be shipped in bulk carloads at substantial savings over bag shipments—is easily stored without any deterioration.**
5. **PURITE gives 100% *fluxing action* in the cupola.**
6. **PURITE is the best and most economical refining and desulphurizing agent for ladle treatment.**

These are some of the indisputable benefits which explain why Purite is still the outstanding cupola flux and ladle desulphurizer available today. You'll want to know more about why Purite is so popular with so many leading foundries—so write today for full, factual information. Mathieson Chemical Corporation, Mathieson Building, Baltimore 3, Maryland.

Mathieson
CHEMICALS
Purite is sold by all leading foundry supply houses in the United States and Canada.

PURITE 100% FUSED SODA ASH
THE SCIENTIFIC FLUX FOR BETTER MELTING AND CLEANER IRON

TECHNOLOGY DEPARTMENT

they cure "YAWNING" on the job...

PUBLIC LIBRARY
OCT 24 1949
DETROIT

. . . with NICKEL CAST IRON

"Yawn" or "give" in a cast machine part often spells rejects for the machine user.

No ordinary cast iron solves this problem, because the low elastic modulus of unalloyed iron under heavy stresses frequently permits dimensional changes.

But..."give" can be reduced to a negligible minimum.

In the 20-ton casting shown above, produced by Schneider Bowman Company, Inc., Philadelphia, Pa., for a large punch press made by Wiedemann Machine Company of Philadelphia..."give" was minimized by casting this part in iron containing 1.50 percent Nickel.

Developing 45,000 pounds per square inch tensile strength in heavy sections, this casting exemplifies the high elastic modulus and strength obtainable with Nickel cast iron.

Hundreds of foundries now use Nickel cast iron to secure these basic advantages:

IN THE FOUNDRY—
Nickel aids the progressive foundry to meet high mechanical property specifications.

IN THE MACHINE SHOP—
Nickel cast irons provide strong, readily machinable castings that take a smooth finish.

IN SERVICE LIFE—
Nickel cast irons assure long, trouble-free performance for the ultimate user.

EMBLEM OF INCO SERVICE
TRADE MARK

Over the years, International Nickel has accumulated a fund of useful information on the selection, fabrication, treatment and performance of engineering alloy steels, stainless steels, cast irons, copper-base and other alloys containing Nickel. This information is yours for the asking. Write for "List A" of available publications.

THE INTERNATIONAL NICKEL COMPANY, INC.

67 WALL STREET
NEW YORK 5, N. Y.

CROWN HILL

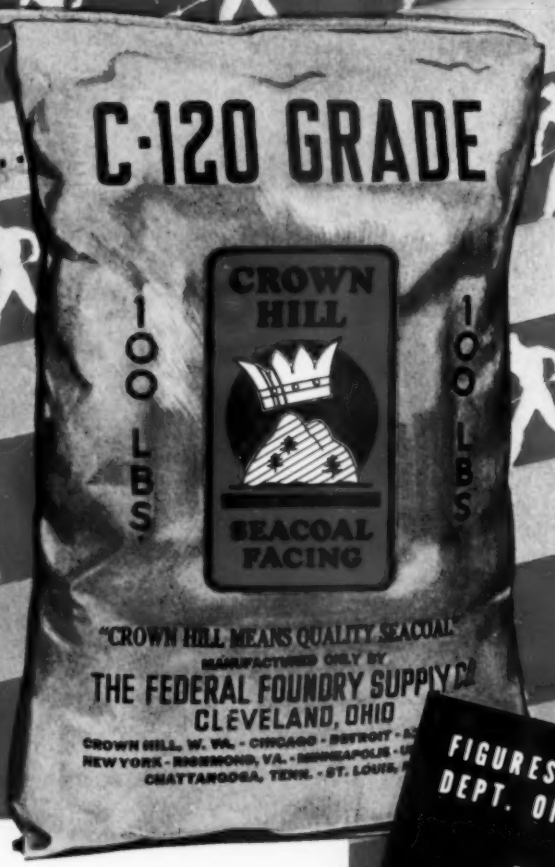
MORE...

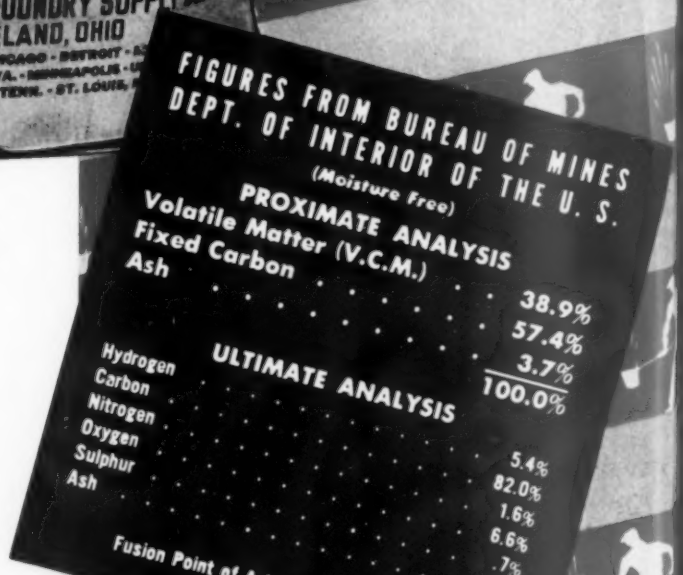
MORE, MORE AND MORE...

FOUNDRYMEN CHOOSE

CROWN HILL

SEACOAL





The Seacoal of Accepted Reliability

What makes Crown Hill such a popular seacoal?

Quality . . . Crown Hill's high volatile induces quick combustibility, quicker escape of gas and steam, better finish, lower cleaning costs, fewer defects.

Popularity . . . Foundrymen far and wide have used Crown Hill for many years. They know by experience how good Crown Hill really is.

Manufacturer . . . Made by the friendly friend of the foundries, The Federal Foundry Supply Co., a good company with which to do business.

Test Crown Hill Seacoal Facing in your foundry.

THE FEDERAL FOUNDRY SUPPLY COMPANY

Seacoal Plants:
CROWN HILL, W. VA. • CHICAGO • DETROIT • MILWAUKEE • RICHMOND, VA.
CHATTANOOGA, TENN. • NEW YORK • ST. LOUIS • UPTON, WYO.
TWIN CITIES: Wiener and Company
Terrace Station Box 71, Minneapolis 15, Minn.

4600 East 71st Street
Cleveland 5, Ohio

NOVEMBER, 1949

THE FOUNDRY

VOLUME 77—NUMBER 11

EDITORIAL STAFF

FRANK G. STEINEBACH
Editor

WILLIAM G. GUDE
Managing Editor

EDWIN BREMER
Metallurgical Editor

PAT DWYER
Engineering Editor

ROBERT H. HERRMANN
Associate Editor

DON S. CADOT
Art Editor

VIRGINIA C. TAYLOR
Assistant Editor

VIRGINIA B. HARMS
Assistant Editor

New York.....B. K. PRICE, L. E. BROWNE
Chicago.....E. F. ROSS, H. C. TUTTLE
Detroit.....A. H. ALLEN
Pittsburgh.....J. C. SULLIVAN
Washington.....E. C. KREUTZBERG
London.....VINCENT DELPORT

Advisory Staff

JOHN W. BOLTON
JOHN HOWE HALL
ALBERT E. GROVER
HARRY A. SCHWARTZ

BUSINESS STAFF

J. M. LATHROP
Advertising Manager

New York.....J. F. AHRENS
Chicago.....G. A. POPE, A. W. JOHANSEN
Cleveland.....A. L. KLINGEMAN
Los Angeles.....F. J. FULLER

Circulation and Research

J. W. ZUBER, *Director*
R. L. HARTFORD, *Market Research*
KENNETH L. MOUNTAIN, *Subscriptions*

Production Department

A. V. ANDERSON, *Manager*
W. J. STAAB, *Assistant Manager*

Main Office

Penton Building, Cleveland 13, Ohio

Branch Offices

New York, 17 ..... 16 East 43rd St. Murray Hill 2-2581
Chicago, 11 ..... 520 N. Michigan Ave. Whitehall 4-1234
Detroit 2 ..... 6560 Cass Ave. Madison 3024
Los Angeles, 4 ..... 130 N. New Hampshire Ave. Dunkirk 2-1758
Pittsburgh, 19 ..... 2806 Koppers Building Atlantic 1-3211
Washington, 4 ..... National Press Building Executive 6849
London ..... 2 Caxton St. Westminster, S.W. 1

THE FOUNDRY is published monthly by THE PENTON PUBLISHING CO., Penton Building, 1213 West Third Street, Cleveland, O. EARL L. SHANER, Chairman of the Board and Treasurer; GEORGE O. HAYS, President; RUSSELL C. JAENKE, Vice President, and FRANK G. STEINEBACH, Vice President and Secretary.

Subscription: In the United States and possessions, Canada, Mexico, Cuba, Central and South America, one year $3; two years, $5. Other foreign countries, $6. Single copies 35 cents. Copies published three months or more previous to date of current issue, 50 cents.

Member: Audit Bureau of Circulations and National Publishers Association. Copyright 1949 by THE PENTON PUBLISHING CO.

Entered as second class matter at postoffice at Cleveland under act of March 3, 1879.

THE FOUNDRY is indexed regularly by Engineering Index Inc. 29 West 39th St., New York 18

Editorial 65

What Are Foundries Doing About Public Relations? 66
By FRANK G. STEINEBACH

Segregation In Small Steel Castings 74
By HAROLD F. BISHOP

Maintenance of Air Compressors 78
By GEORGE B. COMFORT

Standards Must Be Observed in Cupola Operations 79
By R. H. OLMSTED

U. S. Navy Casting Research 80
By H. H. HARRIS and ERLE F. ROSS

Modern Practice in Investment Casting 82
By HIRAM BROWN

Cleaning Up the Foundry Can Pay Dividends 84
By BENJAMIN MELNITSKY

Develops New Type Unit for Desulphurizing Cupola Iron 88
By FRANK E. BATES

The British Team Reports on U. S. Steel Foundries 92

Why Not Use More High Shrinkage Bronze? 93
By HAROLD J. ROAST

FEF Committees Play Increasingly Important Role 110

Report on Steel Founders' Society T. and O. Conference 118

Malleable Founders' Society Holds Industry Meeting 120

International Foundry Congress 130
By VINCENT DELPORT

California Public School Offers Foundry Practice Course 138

Man-to-Man on the Molder's Bench 142
By RALPH L. LEE

Around Detroit 148
By ARTHUR H. ALLEN

Selecting and Evaluating Foundry Supervisors 182
By RICHARD S. SOLOMON

The Adventures of Bill 194
By PAT DWYER

Questions and Answers 94
Men of Industry 100
Foundry Statistics 114
Foundry Data Sheet 115
Foundry Developments 128
Meeting Calendar 135
Obituary 140
Activities of Foundry Groups 152
Industry Briefs 180
Equipment and Supplies 214
Helpful Literature 217
Trade Publications 237
Where-to-Buy Directory 259
Advertisers' Index 279

PROVEN PERFORMANCE

CYLINDER LINER CORES FOR OPPOSED-PISTON DIESEL ENGINE BEING SET IN POSITION.

The **FAIRBANKS, MORSE & CO.**

SETTING THE CORES FOR THE PISTONS. 2 PISTONS ARE CAST IN EACH MOLD.

More and more of those fast, sleek streamlined trains that roar over the rails in almost motionless comfort, setting new records for speed and economy, are powered with Fairbanks-Morse, opposed-piston diesel engines. More and more rail yards are being serviced by powerful Fairbanks-Morse diesel switchers that smoothly and efficiently shuttle cars about . . . making up trains for the long hauls. For Fairbanks, Morse & Co., is as prominent a name in railroading as in scale manufacture.

Today, with over 3½ million horsepower in active service, F-M opposed-piston diesel engines are proven and accepted the world over for locomotives, marine engines, and stationary power plants.

Proven performance . . . at a favorable cost advantage . . . builds an ever-growing reputation for Fairbanks-Morse. Wherever these engines have been installed, reliability and economy have been demonstrated beyond question.

Only LINOIL cores go into the casting of the special cylinder liners for opposed-piston engines. In Fairbanks-Morse foundries, as in thousands of others, LINOIL is the recognized standard for dependable core oil.

Over 600,000 gallons of LINOIL used each month attest to LINOIL's proven performance in American foundries. This reputation for value and uniformity is your guaranty of good cores . . . at low cost . . . every time you pour. No wonder LINOIL is considered . . . "the logical oil for cores".

THE LINOIL — THE LOGICAL OIL

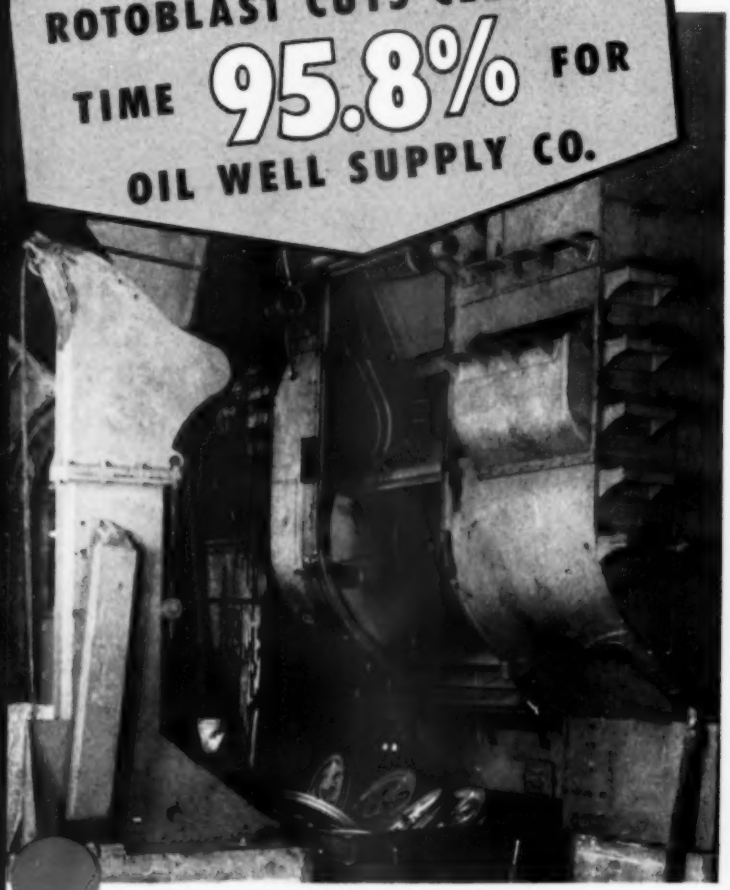
WERNER G. SMITH COMPANY

(DIVISION OF ARCHER-DANIELS-MIDLAND COMPANY)

2191 WEST 110th STREET — CLEVELAND 2, OHIO

→ Here's how YOU cleaning costs with

ROTOBLAST CUTS CLEANING TIME 95.8% FOR OIL WELL SUPPLY CO.



Pangborn Rotoblast Speeds Cleaning of Castings with Intricate Pockets

In 1948, the Oil Well Supply Co. installed this 21 cubic foot ROTOBLAST Barrel to replace *five* conventional tumbling mills at its Imperial Works in Oil City, Pa. *The results are amazing!* The ROTOBLAST Barrel cleans *two tons* of medium size castings in *15 to 20 minutes* as compared to *6 to 8 hours* with the older equipment. That's a saving of 95.8% on cleaning time alone for these castings with intricate shapes and deep pockets.

ROTOBLAST SAVES $5,080 A YEAR FOR YATES AMERICAN MACHINE CO.

This Rotoblast Installation Replaces Five Old-Fashioned Tumbling Mills

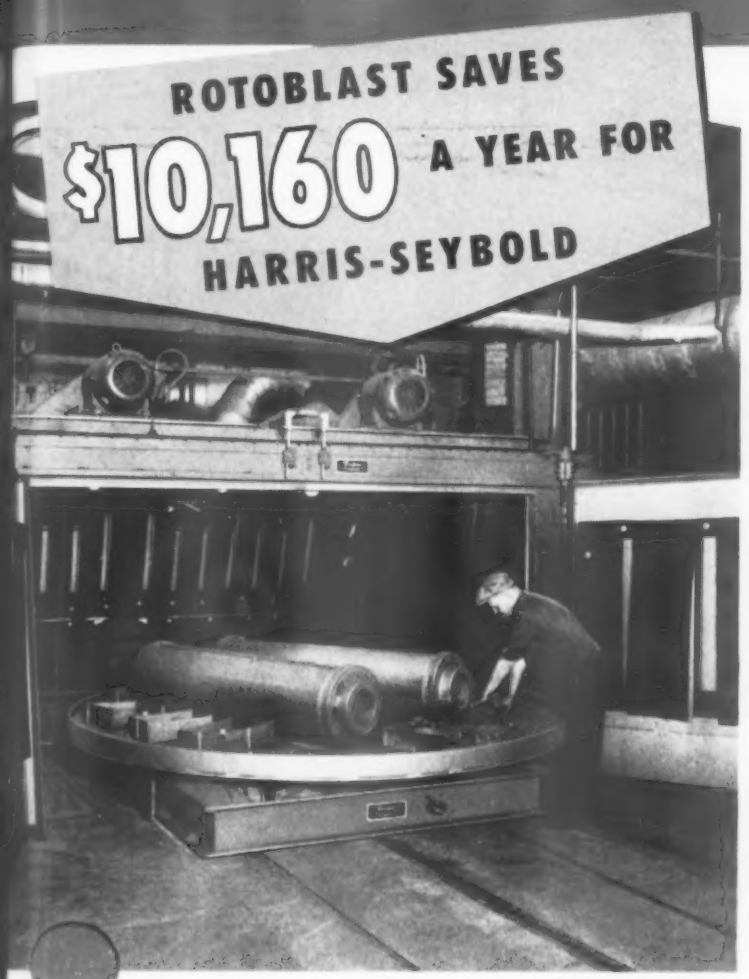
Here's how Yates American Machine Co. saves money in their cleaning room: their new ROTOBLAST Team of Table and Barrel (table shown here) cleans small castings *18 times faster*, large castings *3.7 times faster*. Actual cash savings add up to *$5080 on labor alone*. Two men are released for more productive work . . . downtime is virtually eliminated. In addition, five old-fashioned tumbling mills are eliminated!

MORE THAN 25,000 PANGBORN MACHINES SERVING INDUSTRY

Pangborn

* Trademark of Pangborn Corporation

can SLASH blast Pangborn ROTOBLAST



Rotoblast Releases Four Men for Other Work, Cleans Castings from One Pound to One Ton

Harris-Seybold eliminates old-fashioned sand-blasting bottlenecks in their foundry with ROTOBLAST. This new ROTOBLAST room saves *32 man hours a day* . . . cuts cleaning time *66⅔%* . . . saves *$10,160* per year on labor costs alone. Every single casting from one pound to one ton is cleaned by this room. Four men, formerly needed in the cleaning room, have been released by ROTOBLAST for more important work elsewhere in the foundry.

USERS FIND ROTOBLAST SOLVES PROBLEM OF HIGH LABOR COSTS— SAVES MONEY CLEANING LARGE OR SMALL CASTINGS

If you want to save on blast cleaning *and* get a faster, better job . . . modern Pangborn ROTOBLAST is a must for your cleaning room. Whether your foundry needs Barrels, Tables or Table-Rooms you'll find Pangborn has a standard model designed for your requirements.

Pangborn ROTOBLAST *cleans faster* because it throws more abrasive over a larger area with greater density . . . *cleans better* because it gets into small pockets, leaves no abrasive to damage machining equipment . . . *cleans cheaper* because it requires less horsepower, uses less manpower, needs less maintenance, eliminates need for air compressor!

Look to Pangborn for the Latest Developments in Blast Cleaning and Dust Control Equipment

Get the facts!

Find out how much money you can save with Pangborn ROTOBLAST. Bulletin 214 gives full details, technical information. Write for it today without cost or obligation. Address: PANGBORN CORPORATION, 1400 Pangborn Blvd., Hagerstown, Maryland.

BLAST CLEANS CHEAPER

with the right equipment for every job

Champions

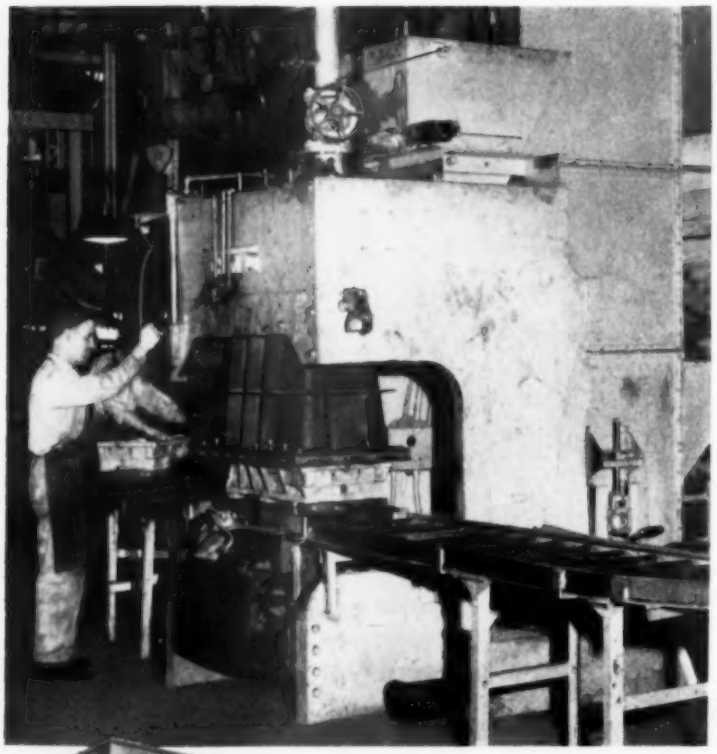
castings, to produce them more economically, and to indulge in better and more intelligent sales efforts.

..., the industry needs to produce better

Frank G. Steinbach
Editor

THE FOUNDRY
WHEREVER METALS ARE CAST

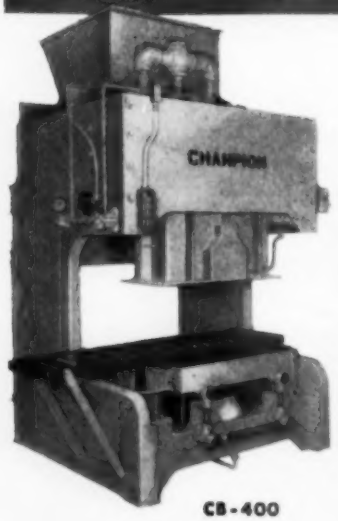
August, 194



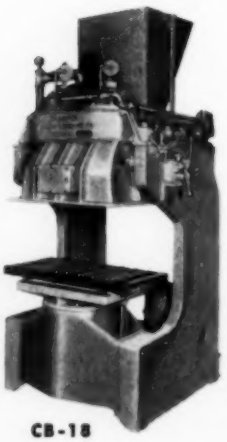
Users of Champion Molding Machines and Core Blowers have found a dependable way to achieve the goals you set, Mr. Steinbach. Champion machines are noteworthy for the quality of the work they produce, and their speed and ease of operation. The foundry that uses Champion machines to produce better castings at lower cost has the strongest possible sales point.

• • •

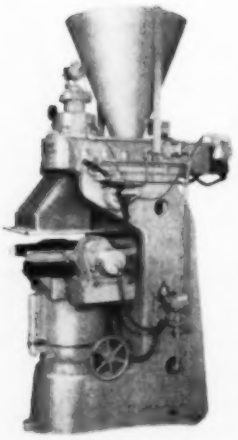
Champion CB-400 core blower in the Milwaukee foundry of International Harvester Company.



CB-400



CB-18



CB-15

CB-12

CB-10

HEAD STRAIGHT TO THE GOAL:

BETTER CASTINGS AT LESS COST!

Every Champion core blower, from the largest to the smallest, possesses every feature that gives every Champion its outstanding speed, safety and precision. Operators using Champion Core Blowers find their work easy to learn and pleasant to perform. All effort is supplied by the machine, the operator merely directs and controls it. Hence there is no fatigue to slow down production toward the end of the day.

Size of core has negligible effect on the speed of blowing, and Champions turn out such uniformly accurate pieces that even the largest sectional cores are assembled without jigging or grinding.

Champion engineering, based on a vast experience, has provided the strength, accuracy and simplicity of operation on every size Champion Core Blower, that makes them favorites with operator and management alike, in leading foundries the world over.

CB-5

Champion engineers and production specialists are glad at all times to give you the benefit of their long experience in helping you solve any mold or core making problems. Champion molding machines, jolt squeezers, rollover and draw machines have the high productive capacity, the precision and ease of operation that make the big difference in profitable production. There's a place in any up-to-date foundry for Champion equipment. Let us show you what these efficient machines can do for you.

CHAMPION FOUNDRY AND MACHINE COMPANY

SALES OFFICE: 1314 W. 21st STREET
CHICAGO 8, ILLINOIS

GENERAL OFFICE AND PLANT:
ROCKFORD, ILLINOIS

MOLDING MACHINES **CORE BLOWERS** **THE ELECTRIC RIDDLE**

SWEDEN • NORWAY • DENMARK • FINLAND
A. B WESTIN & BACKLUND
8 Liljeholmsvagen, Stockholm

FRANCE • BELGIUM • SWITZERLAND • HOLLAND • THE SAAR
BONVILLAIN & RONCERAY, INC.
Rue Paul Carle, Choisy Le-Roi, France

ITALY
SOCIETA TORINESE ADESIVI RESINE
Corso Moncalieri 414, Torina, Italy

ARGENTINA • BRAZIL • URAGUAY
W. F. GUTH INDUSTRIAL EQUIPMENT & FURNACE CO.
Avenida R.S. Pena 852, Buenos Aires, Argentina

CHILE
MAURICIO HOCHSCHILD & CIA. LTD.
Casilla 153 D, Santiago, Chile

Velsicol core oils: Uniformity and Strength

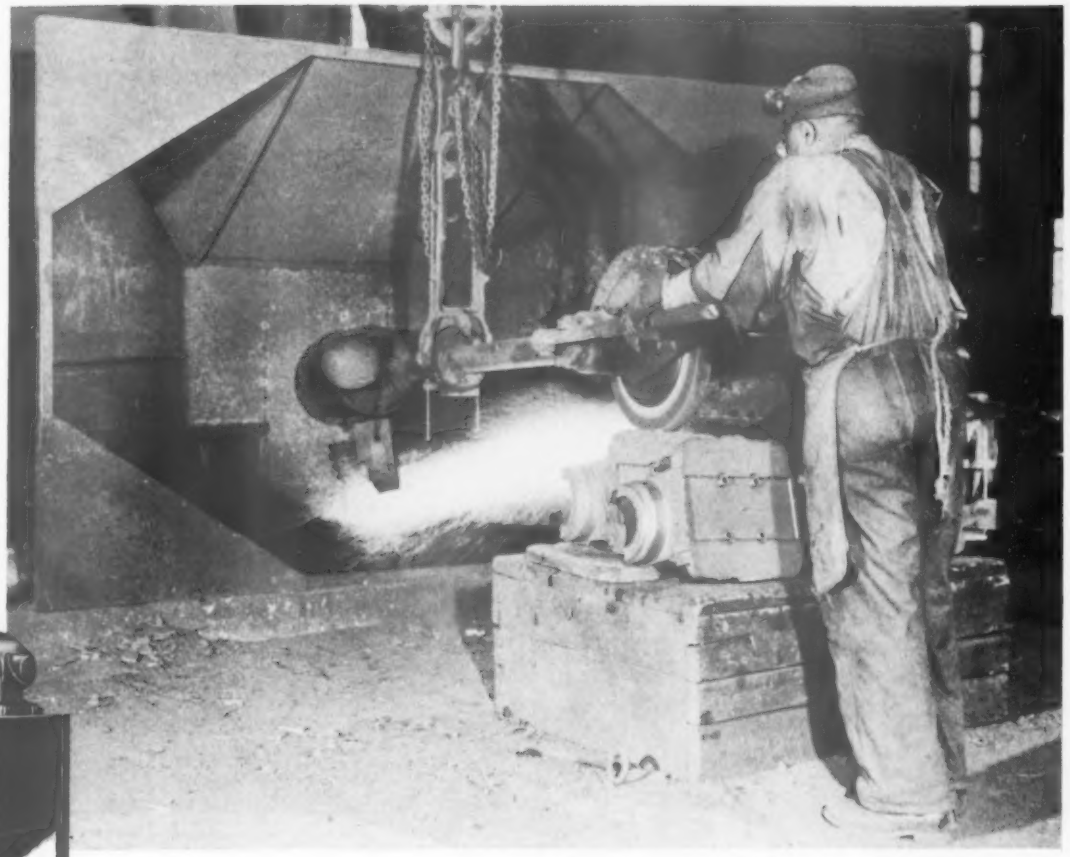
Many outstanding foundries have increased their production of uniform, strong castings by using Velsicol core oils. These outstanding core oils offer *controlled uniformity,* insured by rigid laboratory control - *accelerated baking properties* with no overbaking - *impressively low gas evolution* that eliminates blow holes - *neat workabitity* being exceptionally clean in core blowing machines - economy assured by a specially synthesized hydro carbon resin.

For further information, wire or write: **VELSICOL CORPORATION,** 330 E. Grand Ave., Chicago 11, Illinois.

VELSICOL CORPORATION

REPRESENTATIVES IN ALL PRINCIPLE CITIES

Cleared for action and cleanliness



Roto-Clone removes swing frame grinder dust without restricting operation

YOU don't have to penalize the efficiency of a swing frame grinder to practice complete dust control. Just examine the picture above. There's plenty of elbow room for both grinder and operator—and not a sign of dust in the area. The answer—installation of an AAF Type D Roto-Clone* utilizing a booth type hood.

The Type D Roto-Clone is compact, combining exhauster, dust collector and storage hopper in a single unit. Its collection efficiency is not affected by changes in air volume. Unit requires little space and may be located at or near dust source to eliminate long pipe runs and reduce power costs.

If your foundry has swing frame grinders, snagging wheels, abrasive cleaning equipment, shakeouts or electric furnaces not effectively ventilated—get information on a Roto-Clone to handle such jobs. Call your local AAF representative or write direct for Bulletin No. 270-A.

AMERICAN AIR FILTER COMPANY, INC.
266 Central Avenue, Louisville 8, Ky.
In Canada: Darling Bros., Ltd., Montreal, P. Q.

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

®AAF

ROTO-CLONE®
DUST CONTROL EQUIPMENT

**Roto-Clone is the trade mark (Reg. U. S. Pat. Off.) of the American Air Filter Company, Inc., for various dust collectors of the dynamic precipitator and hydrostatic precipitator types.*

Sure to suit your pressure needs

Gardner-Denver Class "RX" Single-Stage Horizontal Compressor—available in capacities from 89 to 1292 cubic feet displacement per minute.

Whether you need air at the usual shop pressures . . . or considerably below . . . there's a Gardner-Denver "RX" Compressor just right for your job. Available in a wide range of sizes, these compressors are famous for a variety of heavy-duty, full-load services. Volumetric efficiencies rate high — power costs unusually low. At the right are other reasons why you find the "RX" in so many different industries.

For complete information, write Gardner-Denver Company, Quincy, Illinois.

In Canada: Gardner-Denver Company (Canada) Ltd., Toronto, Ontario

★ Complete water jacketing of cylinder, heads, and air passages assures low discharge temperature.

★ Suction valve unloaders on all inlet valves result in lowest power consumption during unloaded period.

★ Gardner-Denver Duo-Plate "Cushioned" Valves—simple, durable, quiet.

★ Large, unrestricted port areas help reduce heat of compression; insure effective lubrication with minimum oil consumption.

★ Streamlined, enclosed main frame completely oil and dust tight—yet all working parts are easily accessible.

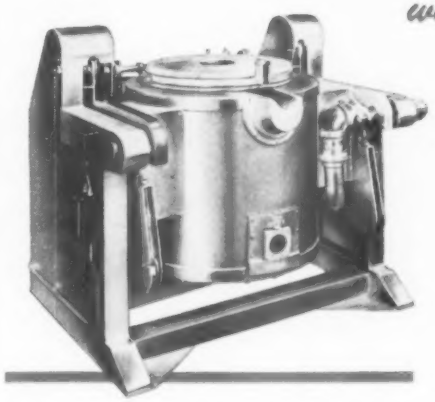
★ Timken adjustable double-row tapered roller bearings support crankshaft.

GARDNER-DENVER SINCE 1859

HERE'S HOW...

LINDBERG-FISHER TILTING FURNACES DOUBLE PRODUCTION....

with half as many furnaces - at 39% lower fuel cost!



See your Lindberg-Fisher man for full details, or write for Bulletin No. 57-A.

Hammond Brass Works, Hammond, Indiana, manufacturers of fine bronze, valves and fittings, recently installed 6 Lindberg-Fisher constant-arc nose pouring, gas fired, tilting furnaces for their melting and pouring operations. They have operated these furnaces for more than 6 months, 8 hours a day, 5 days a week. Their experiences show greatly increased production, reduced production costs, with safer and cleaner operating conditions.

Hammond Brass Works reports that small, obsolete furnaces were replaced with half as many large, modern Lindberg-Fisher mechanized tilting furnaces. The number of necessary heats per day was reduced one-third while double the quantity of molten metal was handled. Fuel consumption per lb. of metal was reduced 39%, labor cost per operation was lowered and crucible life increased from 65-70 heats to an average of 95-100 and up to 200 heats per crucible. Clean-up time has been reduced and maintenance problems simplified—resulting in a safer, cleaner operation, and raised employee morale.

Fisher Furnaces

A DIVISION OF LINDBERG ENGINEERING CO.

2453 West Hubbard Street, Chicago 12, Illinois

FOR FASTER PRODUCTION OF...

Better, Cleaner Castings

STEEL, MALLEABLE, GREY IRON, NON-FERROUS USE...

DELTA CORE & MOLD WASHES

Three easy-to-understand reasons why more foundries use DELTA Core and Mold Washes . . .

1. MORE PERFECT CASTINGS . . . 2. LOWER CLEANING ROOM COSTS . . . 3. LESS SCRAP IN MACHINING.

HERE'S WHY...

a. Delta Core and Mold Washes "Anchor" themselves by penetrating from 3 to 5 grains deep into the sand. This bond between the wash and the sand . . . a distinctive DELTA characteristic . . . produces an expansion-resisting coating essential to the production of finer finished castings.

b. The hot strength of Delta Core and Mold Washes increases with each degree of temperature rise from 1800°F to 3000°F providing maximum critical hot strength for all foundry applications.
The higher hot strength of DELTA Core and Mold Washes eliminates surface sand fissuring, excessive sand expansion and distortion.

c. No gas leakage through Delta Core and Mold washed surfaces. Gases produced by decomposition of organic binders in the core sand cannot leak through Delta Core and Mold washed surfaces to contact the molten metal. Only Delta Core and Mold Washes provide this unique and all-important insurance against defective castings resulting from core gas leakage. DELTA Core and Mold Washes insure more perfect castings with finer finished surfaces.

DELTA CORE & MOLD WASH-BASE
Mix with silica flour and water to produce finished wash.

•

FOR STEEL
STEELKOAT — Special Core and Mold Wash.

•

FOR GREY IRON & MALLEABLE
Grakoat — Blackoat — Hi-temp.

•

FOR NON-FERROUS METALS
Non-FerrusKoat.

•

FOR ALL SAND CAST METALS
THERMOKOAT — It's Plasti-Lastic.
PYROKOAT-Hi-Speed.

•

FOR UNUSUALLY HIGH TEMPERATURE CONDITIONS
Z-KOAT-High-fusion-temp wash.

•

• *Ask for a liberal working sample.*

There is no "just as good" substitute for any DELTA Core and Mold Wash just as there is no substitute for DELTA'S scientific laboratory control of production which safeguards the quality and uniformity of all DELTA Foundry Products. DELTA Research laboratories developed, and pioneered the use of, Plastic-type Core and Mold Washes . . . and still leads the field in the development of new products for improved foundry practices.

DELTA OIL PRODUCTS CO.

MILWAUKEE 9, WISCONSIN

APEX Aluminum ALLOYS

Research leadership back of every Ingot

Custom-tailored alloys to meet your most rigid casting requirements. Apex laboratory-controlled alloys are clean, grain-refined and uniform in composition. "Proved best in every test from ingot to casting." Alloy booklet available upon request.

Apex Smelting Company

Chicago • Cleveland

2537 WEST TAYLOR STREET • CHICAGO 12, ILLINOIS
6700 GRANT AVENUE • CLEVELAND 5, OHIO

Field metallurgists are available for your foundry problems, casting engineering and alloy selection.

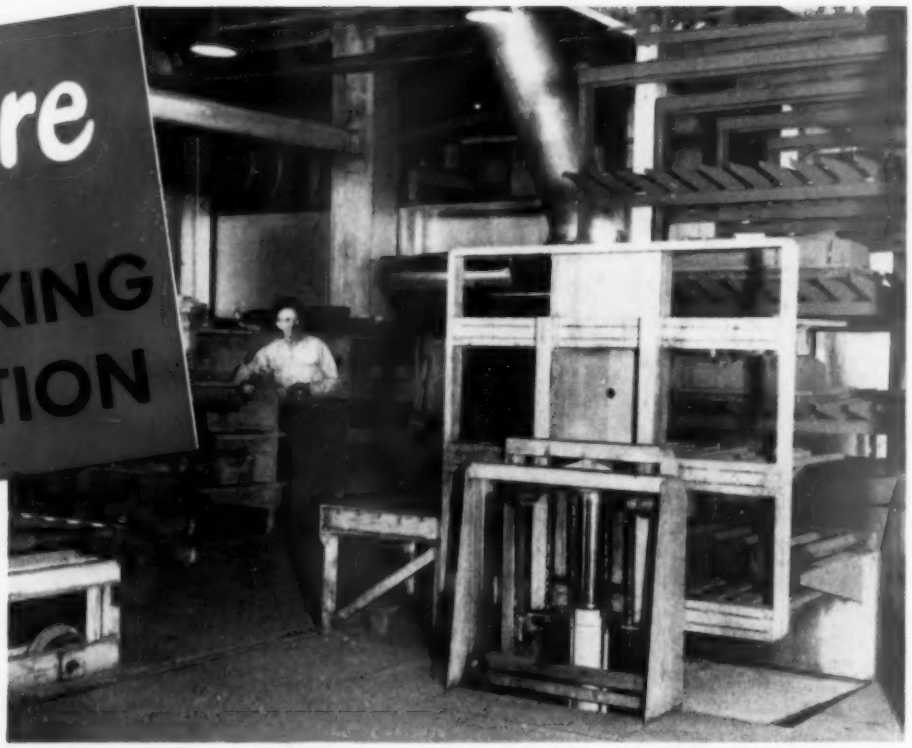
50% More CORE BAKING PRODUCTION

at

OLIVER CORPORATION FOUNDRY

Charles City, Iowa

with this



NEW HYDRAULIC CORE LIFT and TWO DESPATCH CONVEYORIZED OVENS

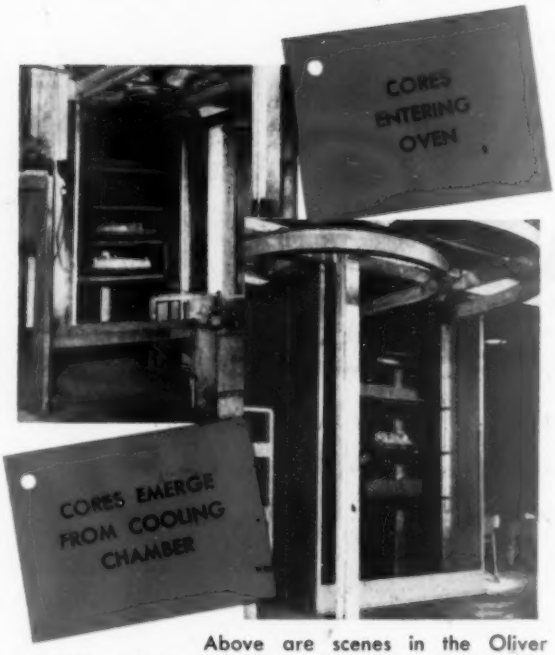
This novel method of core handling was introduced at the Oliver tractor foundry in conjunction with the installation of two modern conveyor type DESPATCH Core Baking Ovens. The hydraulic lift is used to transfer cores to and from the oven conveyor racks. It makes core handling a smooth, continuous and speedy operation which helps to lower operating costs, increase production and minimize working hazards for both employees and cores.

The two ovens, designed and built by DESPATCH are gas-oil fired and have high volume forced convection heating systems for extra fast heat transfer. Adjustable louvered port openings in the duct work keep air distribution and circulation in the oven work chambers at maximum uniformity for faster and better core baking. High velocity air seal curtains add to the baking efficiency of each oven. Insulated cooling chambers are equipped with special fans for removing fumes and for quickly cooling the cores.

The entire system was installed by DESPATCH to meet the company's specific needs. Operating results show 50% more core baking production; 25% lower maintenance cost and 100% improvement in core baking quality.

DESPATCH CAN HELP YOU! Let Despatch engineers help you to higher production records. Despatch assures you faster, better baking in ovens that are right for your particular needs.

WRITE TODAY for Bulletin J-31



Above are scenes in the Oliver Foundry where grey iron transmission cases, front frames and motor blocks for Oliver tractors are turned out. Daily capacities are 30 large cores and 80 medium size cores per hour. Ovens run 16 hours per day and daily tonnage of sand is forty.

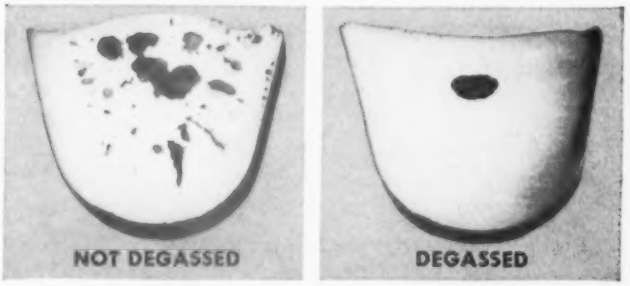
DESPATCH OVEN COMPANY

Minneapolis Office: 619 S. E. 8th Street

Chicago Office: 7070 N. Clark Street

Would You Spend 1/10 cent per pound

to Eliminate Porosity Rejects in non-ferrous castings?



Clean, sound metal means no rejects for porosity when nitrogen degassed. Note that only the normal shrinkage cavity is present in the sample at the right.

FLUSHING with nitrogen is an economical way to avoid porosity in non-ferrous castings—by removing gases dissolved in such molten metals as copper and aluminum, and alloys of these metals. Gas-free molten metal results from using only a few cubic feet of high-purity nitrogen per ton.

Nitrogen degassing does more than eliminate porosity:

Sound Castings: Mechanical properties of treated metal alloys are improved. With copper, brass, and bronze, electrical and thermal properties are also improved. These benefits are in addition to elimination of gas porosity.

Clean Castings: Oxides and entrained slag particles are removed by floating them to the surface.

Uniform Temperature of Metal: Agitation caused by the nitrogen imparts a greater uniformity of temperature. Uniform pouring temperatures are assured.

Elimination of Furnace Atmosphere Control: It is cheaper to remove undesirable gases with nitrogen just before pouring than to try to keep them out of the metal at earlier stages.

Why you should use nitrogen for degassing:

Nitrogen is economical. Copper and its alloys usually require a maximum of 8 cu. ft. of nitrogen per ton of metal. For aluminum and its alloys, a maximum of 25 cu. ft. of nitrogen per ton are usually needed.

Nitrogen is readily available and is easy to handle.

Use of nitrogen presents no health hazard. The gas is inert and does not react with the metal being degassed. It is non-corrosive and non-toxic.

. . .

Write today for further information on degassing, and ask for a copy of the free booklet, "Degassing Non-Ferrous Metals."

Use This Convenient Coupon

The term "Linde" is a registered trade-mark of The Linde Air Products Company.

THE LINDE AIR PRODUCTS COMPANY
Unit of Union Carbide and Carbon Corporation
General Office: New York 17, N. Y.
UCC
Offices in Principal Cities
In Canada: DOMINION OXYGEN COMPANY, LIMITED, Toronto

The Linde Air Products Company
30 East 42nd Street, New York 17, N. Y.

Please send me a copy of the free booklet, "Degassing Non-Ferrous Metals."

Name_____ Title_____

Company_____

Address_____

_____

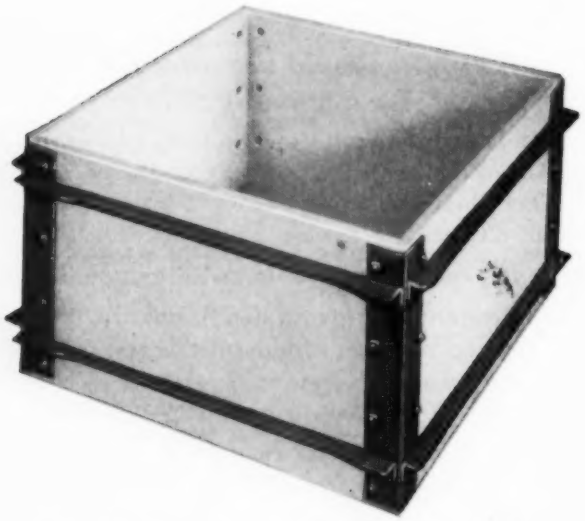
THERE IS NO STICKING

When You Use—

CMD

NON-BURN, NON-WARP SLIP JACKETS

On jackets up to 8" deep, Single Angle Irons are used—as illustrated.



On Jackets over 8" deep, Double Angle Iron Reinforcements are used.

Made of Mon-asbestos, CMD Slip Jackets strip clean from the mold every time. They not only put an end to sticking and costly delays in production, but they also minimize jacket replacements. For CMD Jackets positively will not burn.

They are heavily reinforced with rugged corner irons and cross reinforcing irons, bolted and arc-welded in place to prevent warping. Order today, specifying degree of taper, size of flask at parting line and dimensions of cope and drag to fit below and above parting line.

Write Today for Descriptive Circular!

CMD

CHICAGO MANUFACTURING & DISTRIBUTING CO.

Dept. F, 1928 West 46th Street Chicago 9, Illinois

IN MODERN *FOUNDRY* SERVICE . . .

SWINDELL

ELECTRIC ARC
MELTING FURNACES

provide
MORE TONS PER HOUR
through-

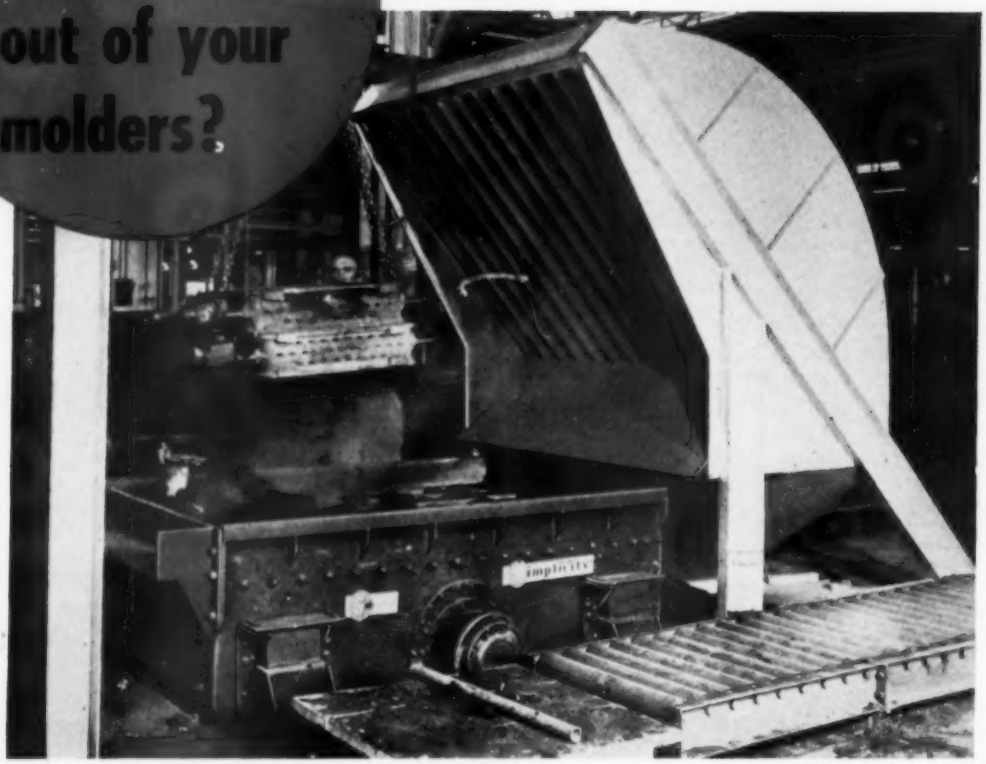
- BETTER RESPONSE TO CONTROL
- WIDER VOLTAGE SELECTION to suit melting problems
- SIMPLICITY OF DESIGN
- RUGGED CONSTRUCTION

Let us discuss your individual problem!

SWINDELL-DRESSLER CORPORATION
Designers and Builders of Modern Industrial Furnaces
PITTSBURGH 30, PA.

Are you making idlers out of your molders?

Let this husky, heavy duty 4'x6' SIMPLICITY SHAKEOUT set the pace in your foundry production.



Ever see the molders in your plant idle—waiting for the shake-out to catch up? That waste can be eliminated—quickly—with Simplicity Shakeouts such as this Heavy Duty 4′ x 6′ shown above. Its rugged strength and years-ahead design will perform your toughest shake-out job. . . .at highest speed!

There's plenty of real out-on-the-job foundry room proof of this high production. Several Simplicity Shake-outs, now in operation, handle as many as 650 flasks per hour. . .with speed to spare. And, if you want both flask shakeout and core knockout with one machine, in one operation. . .Simplicity has been doing that, too, for years!

More than 800 foundries have picked Simplicity Shake-outs during the past 15 years. They know worker's conditions are improved, production is speeded, healthier profits are made when Simplicity Shake-outs roll up their sleeves and go to work. The complete Simplicity Foundry Equipment catalog is a helpful booklet for any foundryman. Your copy is waiting for you. . .just write, right now.

SALES REPRESENTATIVES
IN ALL PARTS OF THE U. S. A.

FOR CANADA:
CANADIAN BRIDGE ENGINEERING CO., LTD.,
WALKERVILLE, ONTARIO

FOR EXPORT:
BROWN & SITES, 50 CHURCH ST.,
NEW YORK 7

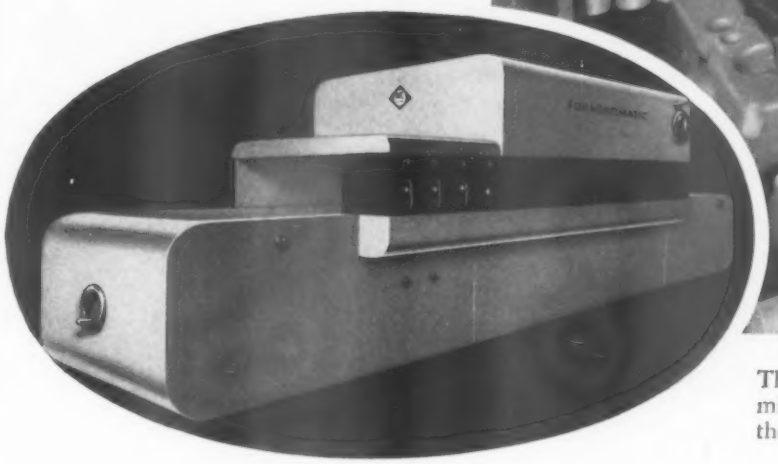
Simplicity
TRADE MARK REGISTERED

ENGINEERING CO. • DURAND, MICHIGAN

80% LESS TIME TO DRY SAND CORES!

NEW DIELECTRIC CORE DRYER

- *Eliminates Excess Heat*
- *Cuts Space Requirements*
- *Reduces Casting Rejects*
- *Slashes Handling Time*



This 21-lb core dried in 12 minutes . . . only 30 minutes from core bench to molding. And 26 of these cores (546-lbs) can be dried in one hour.

NEW *FOUNDROMATIC* SAND CORE DRYER — BUILT BY ALLIS-CHALMERS SAVES TIME — IMPROVES CASTINGS

CORES MOVE directly from the core maker onto the conveyor belt of the *Foundromatic* dryer. When the cores come out of the dryer, they're hard, cool, ready-to-use. No additional curing or steam-out time is required. Cores may be handled with bare hands. All the unpleasantness of working with hot cores is eliminated. Electrode spacing is adjustable to handle cores ranging in height from 2 to 15 in.

Allis-Chalmers own huge foundries were the testing ground for the new unit. A-C foundry and electronic engineers co-operated in applying the time-tested principle of dielectric heating to special foundry requirements.

SEE NEW CORE DRYER OPERATE

Visit Allis-Chalmers foundries and see the new unit in operation. Arrange with your nearby A-C representative, or write direct Electronic Section, Milwaukee. See at first hand the savings possible in space, time and handling with the new core dryer.

Foundromatic is an Allis-Chalmers trademark.

SEND FOR DETAILS

ALLIS-CHALMERS, 1032A SO. 70 ST.
MILWAUKEE, WIS.

Send me information on new *Foundromatic* Sand Core Dryer.

Name.....

Title.....

Company.....

Street.....

City.....State.....

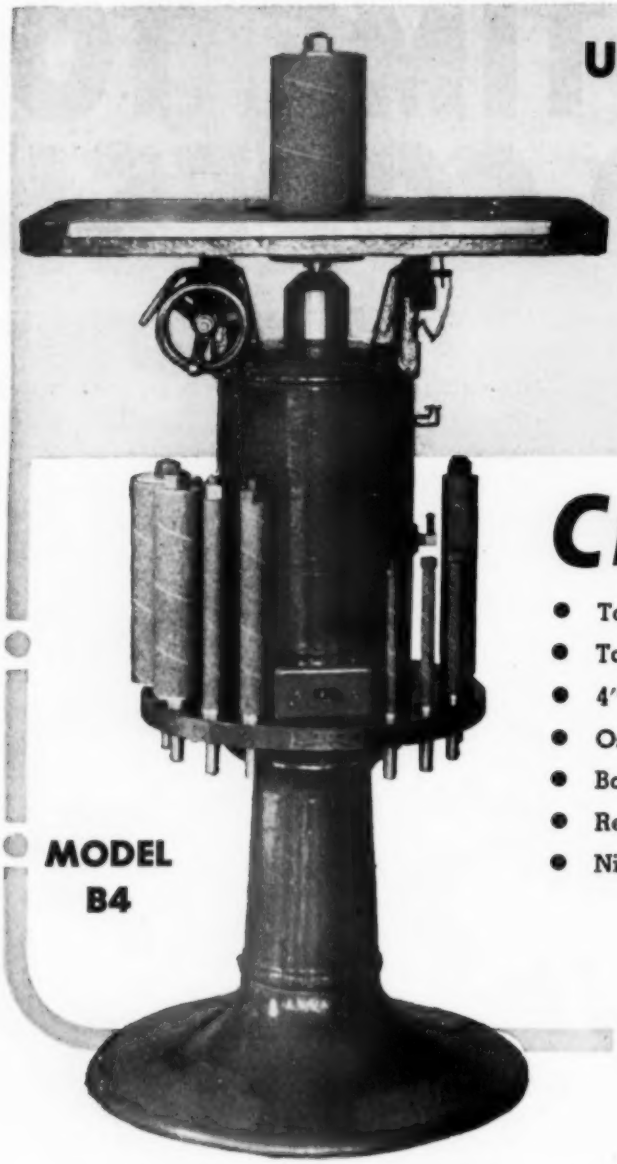
A 2796

ALLIS-CHALMERS

USE FREEMAN EQUIPMENT IN YOUR PATTERN SHOP

FEWER DELAYS AND MORE PRODUCTION

WITH A STATE OSCILLATING SPINDLE SANDER



MODEL B4

CHECK THESE FEATURES

- Table tilts 45° by worm and gear device.
- Table quickly returned to exact horizontal position.
- 4" hand wheel for tilting.
- Oscillating mechanism runs in oil.
- Ball bearing motor enclosed in machine base.
- Rectangular table 20" x 24".
- Nine quick change spindles (as shown) ready for use.

MODEL D15

IT'S *VALUE PLUS* IN STATE 15" & 20" DISC SANDERS

- Large cast iron tables tilt 45°.
- Table 10" x 22" tilts 45°.
- Table quickly returned to exact horizontal position.
- Vertical adjustment of table—center to bottom of disc.
- Furnished with mitre gage, dust bag and extra disc.
- Machine weight 300 lbs.
- Balanced motors and discs for smooth operation.

***Write* for New bulletin No. 49-10-10**

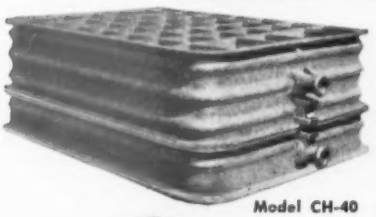
THE FREEMAN SUPPLY CO.

Pattern Shop and Foundry Supplies and Equipment
Mahogany and Pine Pattern Lumber

1153 E. BROADWAY TOLEDO 5, OHIO

Fulton Foundry & Machine Co. Inc., Cleveland, Ohio
— a 27 year continuous user of Truscon Steel Foundry Flasks!

Model OM-1



Model CH-40

Model TM-10

Truscon Steel Foundry Flasks in actual molding use at the Fulton Foundry & Machine Co., Inc.—a 27 year continuous user!

● A product *has to be good* to be used continuously by a customer for over 27 years. Not only good, but it must offer the newest in features and advantages at all times.

Truscon's long experience in flask design . . . Truscon's great facilities for flask production and service . . . Truscon's long association with flask users in every branch of the foundry industry . . . all these give Truscon the products and prestige to assure you exceptional flask service.

Truscon manufactures one-man, two-man and power-handled steel flasks to meet your own particular production requirements. Write for catalog showing wide range of Truscon Steel Flasks available, and ask for an experienced Truscon foundry man to help plan your needs efficiently.

TRUSCON STEEL COMPANY

PRESSED STEEL DIVISION
6202 Truscon Avenue, Cleveland 4, Ohio
Subsidiary of Republic Steel Corporation

Brief Notes for Busy Foundrymen

Have you Tried THIS?

We hesitate to recommend to our readers That they add another ingredient to their molding sands, **but here is a suggestion** which involves both an addition and a subtraction.

Five Star Wood Flour weighs only 10 oz. per quart. Seacoal averages about 32 oz. per quart.

•

Costs can be reduced

and molding results improved by replacing one-fourth of the seacoal with an equal volume of wood flour.

•

The replacement of one out of every four parts of seacoal **means substantial savings** since one ton of wood flour does the work of 3.2 tons of seacoal.

The use of
Five Star Wood Flour
gives the following results:

1. Casting will clean better.
2. Shakeout faster and cleaner.
3. Less loss of sand in the system.
4. Less loss of castings due to scabs, buckles or rattails.
5. More green compression strength added, less bond used.
6. Equalizes moisture in the heap.
7. Better flowability—less butting and tucking.

Try it!

Your tests will prove these statements to be correct.

You'll save money and have better results.

Additional data gladly sent upon request.

BENTONITE

AT ITS BEST . . .

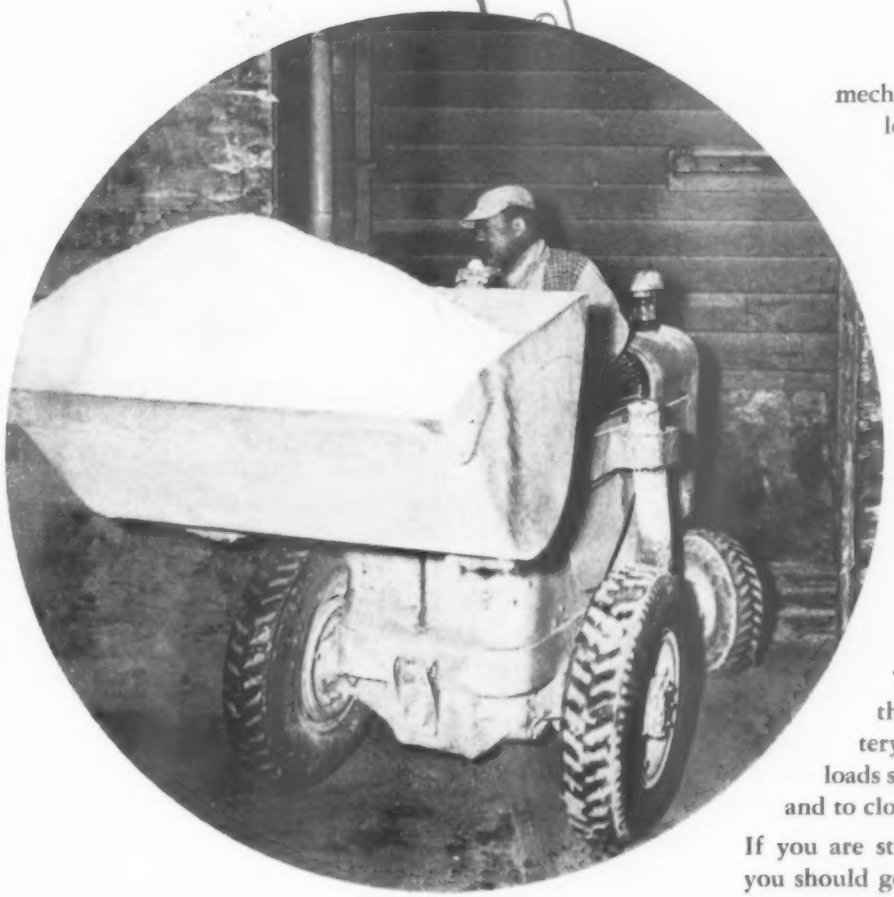
Our New Address • Merchandise Mart Place • Chicago 54, Illinois

VOLCLAY Western Bentonite • FIVE STAR Wood Flour • PANTHER CREEK Southern Bentonite

AMERICAN COLLOID COMPANY Chicago Illinois • Producers Since 1927

Available from Leading Foundry Suppliers in the United States and Canada

Take the Hand Out of Bulk Material Handling!



The Payloader way is the modern mechanical way to shovel, carry, unload, load, dump, windrow, pile and spread bulk materials. PAYLOADERS are designed to do these jobs and *are* doing them in scores of foundries with great savings in time, labor and costs.

Payloaders work inside or outside, on hard floors or soft ground, in congested areas, through narrow doorways and aisles at speeds up to 16 miles per hour. They have ample power, traction and balance to dig full loads of tough materials, to carry them fast and lift, dump, load, spread or windrow them where desired.

The hydraulic bucket control gives the operator complete, precise mastery of the bucket motion—to dump loads slow or fast, partially or completely, and to close the bucket.

If you are still "manhandling" bulk materials, you should get the facts on PAYLOADERS—they pay, they're proven and they're sold and serviced by a Hough Distributor near you. The Frank G. Hough Co., 703 Sunnyside Avenue, Libertyville, Illinois.

SEND FOR CATALOGS
on any of the four sizes of Payloaders: the 10½ cu. ft. Model HA; the ¾ yd. Model HF; the 1¼ yd. Model HL; the 1½ yd. Model HM; also the 2 yd. Payloader Buggy.

HOUGH
PAYLOADER
SAY HUFF
Manufactured by THE FRANK G. HOUGH CO.

Don't Remelt Defective Castings

Multiple Surface Defects Filled

WITH THE

MOGUL

METALLIZING GUN

Shows Mogul gun spraying 3# copper per hour, filling in small surface defects so brass or bronze castings can be polished and plated. 500 castings salvaged per hour.

Mogul F gun can also be used to spray self-bonding wire on small defects in cast iron and pattern build-up.

Defective Castings Salvaged

WITH THE

DOT-WELD

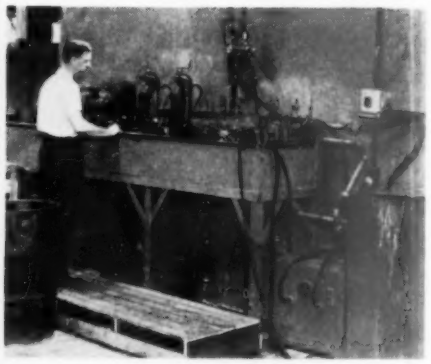
PROCESS

A proven method of efficiently filling ferrous and nonferrous surface defects in castings as well as holes in cast iron sanitary ware so you can enamel. No hard spot—4 times faster than any present method. You can also salvage machined castings that show defects. Ideal for welding aluminum to patterns.

Small to large foundries and pattern shops booster.

U. S. Patent #2445177
2482925
Great Britain #612412
616338

Leaking Pressure Castings Salvaged



WITH THE

MOGUL

CAST SEAL PROCESS

Mogul Cast Seal Process will solve your problem by circulating or by vacuum impregnation. All ferrous or nonferrous castings can be impregnated—no muss or baking—casting sealed will stand any test.

Photo shows M-1000 circulator used for testing and impregnating pump castings.

REPRESENTATIVES

Wm. C. Edgar
Oliver Building
Pittsburgh, Pa.

Mayer & Oswald, Inc.
37 W. Van Buren St.
Chicago 5, Ill.

Shea-Brownell Co.
3903 Olive St.
St. Louis 8, Mo.

Harry G. Mouat
544 American Life Building
Birmingham, Ala.

Henry M. Wood Co.
920 E. McMillan St.
Cincinnati, Ohio

Mr. W. G. Barstow
1302 5th Ave. South
Minneapolis 4, Minn.

Mr. Earl H. Seelbach
Box 56
Kenmore Station
Buffalo 17, New York

Gerlinger Equipment Co.
610 W. Michigan St.
Milwaukee, Wisconsin

Russell F. Lincoln Co.
1058 Maplecliffe Drive
Lakewood 7, Ohio

McArdle Equipment Co.
5724 Navigation Blvd.
Houston, Texas

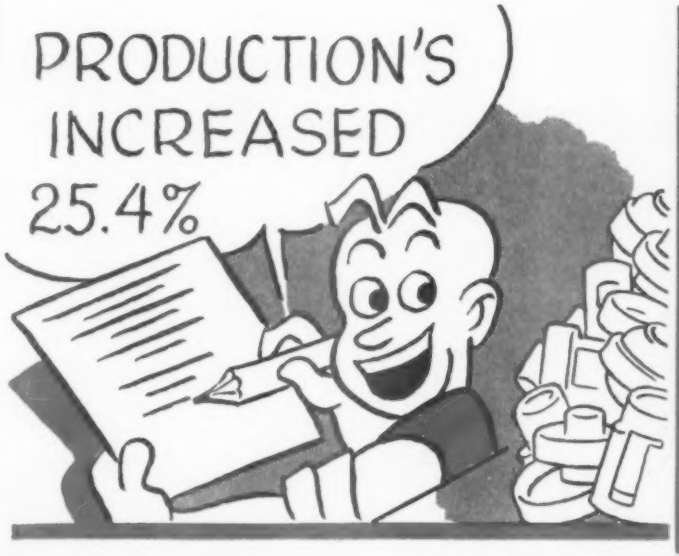
S. R. Vanderbeck
731 Commercial Trust Bldg.
Philadelphia 2, Pa.

West Coast Fdry. Equipt. Co.
3050 E. Slauson Ave.
Huntington Park, Calif.

Mr. H. D. Engelsman
2144 Welton Street
Denver 5, Colorado

SA. PH. BONVILLAIN & E. RONCERAY,
Choisy-le-Roi,
le Rue Paul Carle (Seine)
France

METALLIZING
COMPANY OF AMERICA
3520 W. CARROLL AVE.
CHICAGO 7, ILL.



Manufacturer* Cuts Blast Cleaning Costs 51.8% with MALLEABRASIVE

Test by Reading Gray Iron Castings Inc., of Reading, Pa. proves Malleabrasive saves 51.8% or $3,908.74 a year on blast cleaning costs in their plant.

If you want to save on blast cleaning costs . . . look at the results of this test made by Reading Gray Iron Castings, Inc. After just seven weeks the test showed that 5,900 lbs. Malleabrasive did the same job as 10,300 lbs. of conventional abrasive...replacement parts costs were down 64.7% . . . production increased 25.4% while the cost per ton cleaned was slashed by 51.8%. Here's concrete proof that Malleabrasive's the best abrasive you can buy!

Make Your Own Test!

We'll send you the data needed to run a comparative test like this right in your own cleaning room! Now you can prove to yourself that Malleabrasive slashes cleaning costs up to 50% and more. Malleabrasive is more than "heat treated" or "annealed". Malleabrasive is guaranteed to outperform ordinary abrasives when comparative tests are properly run.

For full details, plus a copy of other Malleabrasive tests, write for TEST INFORMATION, THE GLOBE STEEL ABRASIVE CO., Mansfield, Ohio.

Packed in new orange striped 100 lb. bags

Save on blast cleaning with

PATENTED† Malleabrasive®

†U.S. Patent #2184926
(other patents pending.)

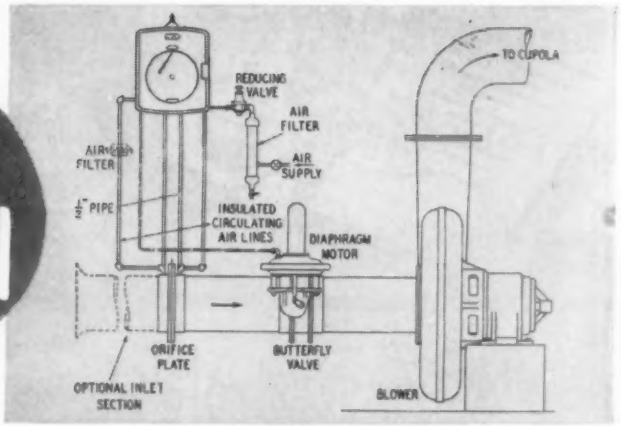
THE GLOBE STEEL ABRASIVE CO., MANSFIELD, OHIO

• MANUFACTURERS OF METAL ABRASIVES SINCE 1907 •

Save Pigging · Save Fuel · Save Rejects

with this

New, Improved Air-weight Control



This is a typical installation set-up of Foxboro Air-Weight Control . . . readily adaptable to either a centrifugal blower (shown in diagram) or a positive displacement blower.

You can get these timely savings through cupola blast that's fully compensated for *every change* in atmospheric temperature and pressure. The right amount of oxygen for the quantity of coke charge assures better combustion, more uniform heats, better quality castings and lower costs.

Foxboro Air-Weight Controllers automatically control cupola blast by *weight of air* instead of volume. They are one of Foxboro's many original developments in instrumentation to cut industrial costs. Representative installations will be found throughout the foundry industry. The names of those located nearest you will be gladly sent on request.

Now . . . you can make the most of modern foundry practice by installing advanced-design air-weight control by Foxboro. Installation is easy and fast. Results will far outweigh the modest investment required. Write for complete details. **The Foxboro Company, 32 Neponset Avenue, Foxboro, Mass., U.S.A.** Branches in principal cities.

Here's the new Model-40 Air Weight Controller. Available for either yoke or flush mounting. Flush mounting permits combination with wind box Pressure Recorder and other cupola instruments on central panel.

FOXBORO REG. U. S. PAT. OFF. **AIR-WEIGHT CONTROLLERS**

MECHANIZE PROGRESSIVELY WITH THE

"Handy Sandy"

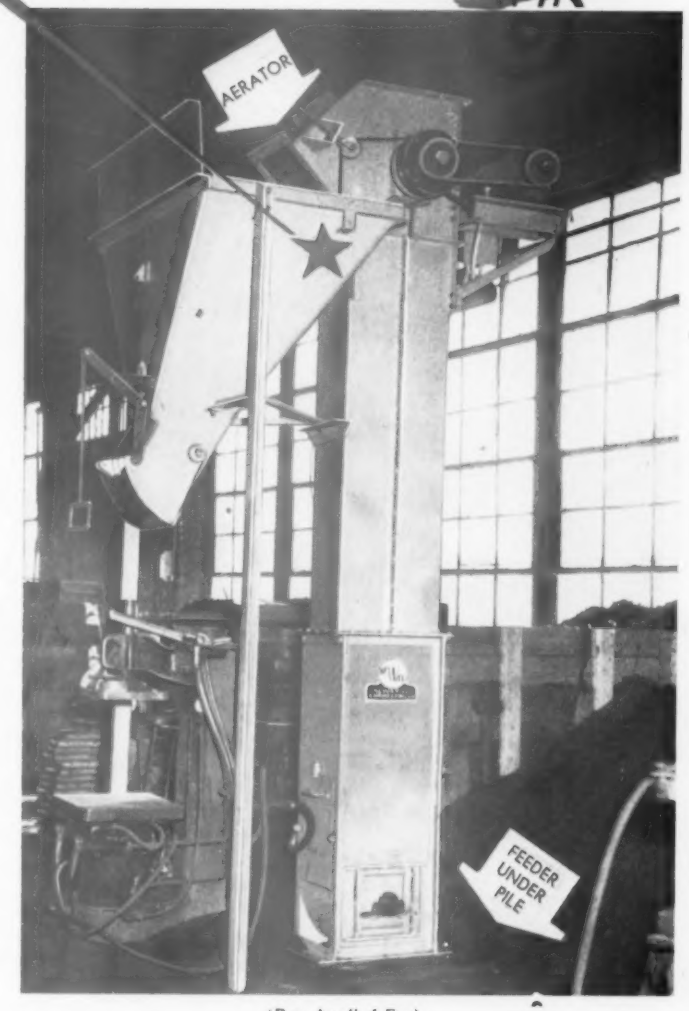
A STANDARD PACKAGE UNIT FOR YOUR INDIVIDUAL FLOORS

COMPACT—ready to run package unit, factory wired with one push button at convenient location. Sets on floor 12'9" overall height, gate 6'1" above floor, feeder lays on floor under your regular heap. No expensive pits or foundations required.

ADDITIONAL CONDITIONING — sand given extra blending and cutting in traveling from heap to bin plus final aeration at top by passing through built-in aerator. Capacity up to 8-tons per hour.

INCREASES PRODUCTION, CUTS COSTS—eliminates shoveling of sand from heap to flask.

FLEXIBLE—feeder and elevating leg can be located at one of 3 positions, heap to right or left of molder or directly in front as illustrated.



(Pat. Applied For)

Write us at once for further details.

NEWAYGO ENGINEERING CO.

NEWAYGO, MICHIGAN

THE New Way LINE

Sand handling, cooling and conditioning equipment, mold conveying systems, reclaiming units, rapless core drawing machines.

REPRESENTATIVES IN PRINCIPAL CITIES

Cutting Foundry Grinding C

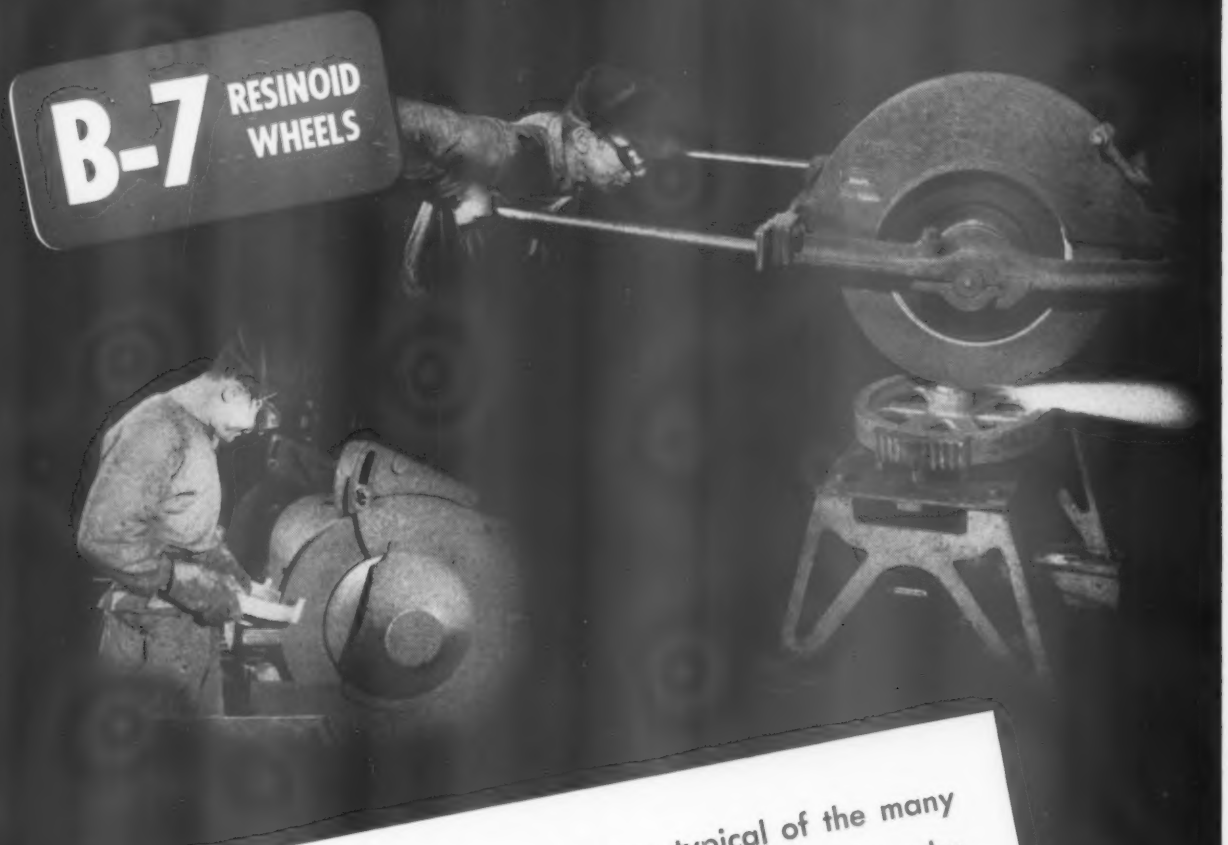
Here's What Three Foundries Say About B-5 and B-7 Wheels—

- A malleable iron foundry reports, "We like Norton B-5 Resinoid Wheels because they cut fast and clean, and what's even more important, last an average of 30% longer than any wheels we've used previously."*
- A foundry producing steel castings says, "In a recent test a Norton wheel (A14-Q4B-5) gave us a cost per pound of material removed that was 32% lower than any wheel previously used."*
- A foundry producing Meehanite castings reports, "Norton B-7 Resinoid Wheels have helped us to hold down our foundry grinding costs even during a period when most production costs have skyrocketed!"*

*Further details and foundry name furnished on request.

Abrasives • Grinding Wheels • Grinding and Lapping Machines • Refractories • Porous Mediums • Norbide Products • Pulpstones • Non-Slip Floors • Labeling and Capsulating Machines

Costs for Over 3 Years!



These enthusiastic performance reports are typical of the many received from foundries throughout the country—foundries who have been cutting costs for three years with Norton B-5 and B-7 Resinoid Wheels.

B-5 wheels are recommended for swing frame, floor stand and portable grinding jobs, where grinding pressures are light and excessive heat is not generated. B-7 wheels are used where the grinding pressure and consequent grinding heat is more severe.

Your Norton abrasive engineer or distributor will be glad to help you select wheels of the right specifications.

W-1228

NORTON® ABRASIVES

NORTON COMPANY • WORCESTER 6, MASS. DISTRIBUTORS IN ALL PRINCIPAL CITIES

NICHOLLS MOLDING MACHINES give you the kind of SERVICE you want. Foundrymen know that they can rely on these HEAVY DUTY machines to produce the maximum number of good molds. This enables you to meet production schedules on time and give your customers satisfactory SERVICE!

NICHOLLS has a complete line of portable and stationary types for the production of light, medium and heavy castings. All machines are available with electric controls for push-button operation.

Wm. H. NICHOLLS Co., Inc.

RICHMOND HILL 18, LONG ISLAND, NEW YORK

ESTABLISHED 1910

FOREIGN MANUFACTURERS AND SELLING AGENTS FOR CONTINENTAL EUROPE AND GREAT BRITAIN—GEORGE FISCHER, LTD., SCHAFFHAUSEN, SWITZERLAND.

NICHOLLS

7 points for better melting

OF FERROUS, NON-FERROUS OR PRECIOUS METALS

with

AJAX-NORTHRUP 20 & 40 KW CONVERTERS

- **Push-button control. The new Ajax-Northrup converter is self-tuning, does not require any adjustments while melting**
- **Negligible maintenance, limited to annual inspection of two electrodes**
- **Efficient, low-cost melting, with trouble-free performance**
- **Extended crucible life**
- **Reproduces the same analysis melt after melt—even with tough-to-handle alloys**
- **Easy, quick changeover from one alloy to another makes it the ideal tool for small foundries, precision casting, and research**
- **High Speed—20 Kw. converter melts 30 lbs. of brass in 20 minutes, or 17 lbs. of steel in 29 minutes. Built also in 3, 6 and 40 kw. sizes. Generator operated units to 8 tons**

Free on request—Ajax technical bulletins covering any melting or heating problem.

SINCE 1916

115

AJAX NORTHRUP
HEATING & MELTING

AJAX ELECTROTHERMIC CORPORATION
AJAX PARK, TRENTON 5, N. J.

Associate Companies

THE AJAX METAL COMPANY • AJAX ELECTRIC FURNACE CORPORATION
AJAX ELECTRIC COMPANY, INC. • AJAX ENGINEERING CORPORATION

LOOSE BARS ON THE JOB IN A HINES FLASK . . .

THE HINES
3431 WEST 140th ST.

LOOSE BARS?

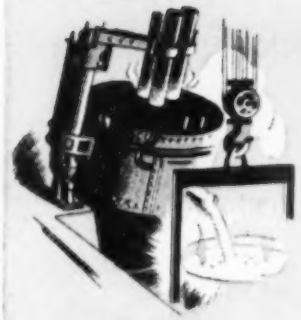
sure you can work 'em in all

HINES SLIP OR POP-OFF FLASKS

Ask Any of Our Sales Engineers for Details

FLASK CO.

CLEVELAND 11, OHIO



Steelmakers are called upon to meet increasingly exacting requirements for cleanliness, quality, and chemical composition of steel. To help steelmakers produce these better steels, ELECTROMET has worked constantly to produce better ferro-alloys. Here are some of the reasons . . .

..why

"ELECTROMET" Alloys

Trade-Mark

are preferred

1 UNIFORMITY OF ANALYSIS

ELECTROMET's specifications and dependable chemical analysis permit the use of the average analysis in calculating charges. In every shipment of ELECTROMET ferro-alloys, you obtain a uniform product resulting from close metallurgical and physical control.

2 WIDE RANGE OF SIZES

An adequate range of sizes, for both lump and crushed material, allows you to select the size best suited to your scale of operations and type of melting facilities for open hearth, electric furnace, or foundry.

3 GOOD SERVICE

ELECTROMET alloys are available for immediate shipment from plants and warehouses that are conveniently located to serve you. Sufficient stocks are kept on hand to meet the varied requirements of ferro-alloy users. Our staff of experienced metallurgical engineers is always ready to give technical help where needed.

The word "Electromet" is a registered trade-mark of Union Carbide and Carbon Corporation

Write for our new catalog "Electromet Ferro-Alloys and Metals." It describes over 50 metals and alloys produced by ELECTROMET and tells of the unique technical service offered to the metal industries.

ELECTRO METALLURGICAL DIVISION
Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.
OFFICES: Birmingham • Chicago • Cleveland • Detroit
New York • Pittsburgh • San Francisco
In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario
Warehouses: Chicago • Los Angeles • Oakland, Calif. • Portland • Sheffield, Ala.

Continuous Grinding . . . when Time is THE Factor!

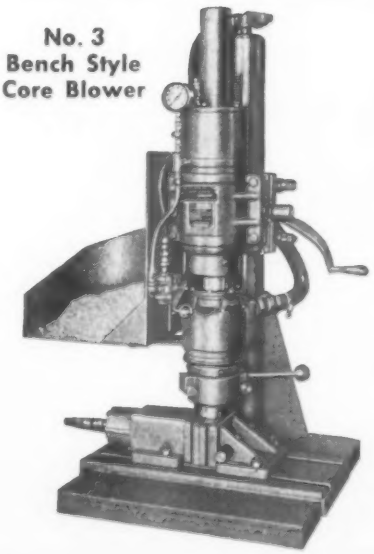
MILWAUKEE CORE GRINDERS
Give You *Accurate* Cores, *Faster!*

When you're really hurried to finish that grinding job you can depend on MILWAUKEE CORE GRINDERS to come through for you. They grind cores down to extreme accuracy to maintain uniform metal thickness . . . and they grind away without interruption. No "down-time"! Maintenance is reduced to a minimum. Milwaukee Core Grinders require very little attention from the operator. They do a better grinding job, faster, at lower cost. Write for literature.

ROTARY TYPE CORE GRINDER (illustrated here) has a 70" table that can be rotated in either direction and a 30" grinding wheel with speed of 2700 feet per minute. Rugged — accurate — built with machine tool precision.

DUAL TYPE CORE GRINDER (not shown here) is available, if desired. It has two grinding stations and an adjustable wheel arm that swings progressively around a 360° circle.

No. 3 Bench Style Core Blower



MILWAUKEE-TACCONE CORE BLOWERS

Both bench style and draw type models available. Blow intricate cores up to 12 lbs. in size. Explosion-like action. Synchronized clamping and blowing increase speed and efficiency. Blown cores automatically released. Can be removed as fast as blown. Completely equipped with blowheads and clamp, ready to operate. Ask for literature.

MILWAUKEE JOLT SQUEEZERS

Produce accurate molds at a high production speed. Combine safety and ease of operation for a simple, fast operating cycle.

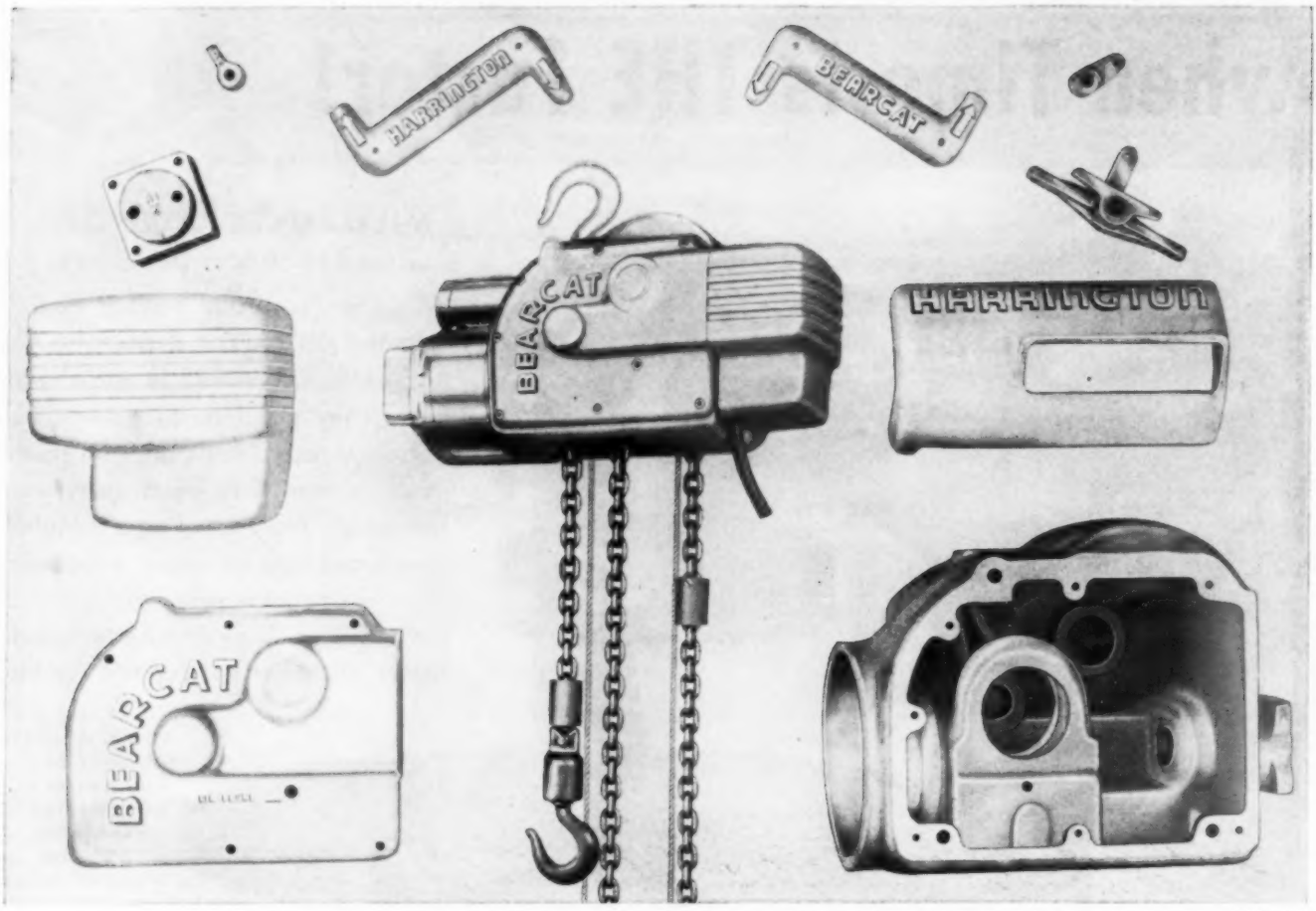
Available in portable type with 10" or 12" diameter squeeze piston or stationary type with 10" to 18" diameter squeeze piston. Conveniently located knee operated jolt and vibrator valves speed operation. Portable type is equipped with riddle rack and mold shelf. Write for Bulletin No. 118.

No. 124 Portable Type Jolt Squeezer

CORE BLOWERS • CORE GRINDERS • MOLDING MACHINES • BRIQUETTING PRESSES

MILWAUKEE Foundry Equipment Co.

3236 W. PIERCE STREET, MILWAUKEE 15, WISCONSIN, U.S.A.



JMLco. F80

Cut Weight, Eliminate Heat Treatment, Improve Properties — with TENZALOY

Casting ten parts of the Bearcat electric hoist (above) in TENZALOY enabled the manufacturer, The Harrington Company, Philadelphia, to:

1. Produce the article without heat treatment, thus saving an added expense.
2. Reduce castings' weight from an average of about 60 lbs. (original ferrous metal design) to 20 lbs., thus improving portability.
3. Cut machining and handling costs.
4. Improve appearance and corrosion properties, thus increasing sales appeal.
5. Virtually eliminate rejects.

The Fisher Casting Company, North Plainfield, N.J., which cast the components shown above, is a longtime user of TENZALOY. Its competent staff knows well this aluminum-magnesium-zinc alloy which Federated developed to give high strength without heat treatment. Therefore, when they recommended TENZALOY, and worked with Harrington and Federated engineers on the project, they were certain of its eventual success.

This happy and profitable experience can be yours, too. Write Federated's Dept. CW for technical pamphlet on TENZALOY.

Federated first in the non ferrous field FMD

Federated METALS DIVISION

AMERICAN SMELTING AND REFINING COMPANY, 120 BROADWAY, NEW YORK 5, N.Y.

Nash
GREAT CARS SINCE 1902
In a recent foundry modernization program at Nash Motors, Kenosha, Wisconsin, division of Nash-Kelvinator, two Allis-Chalmers centrifugal blowers replaced rotary positive blowers! Rated 14,000 cfm at 2.5 lbs. G, both blowers are driven at 3550 rpm by Allis-Chalmers induction motors. They are compact . . . mounted out-of-the-way on light, simple foundations.

Maintain Air Weight and Volume With A-C Blowers!

BOTH WEIGHT AND VOLUME OF CUPOLA AIR can be regulated with Allis-Chalmers centrifugal blowers equipped with air weight control. A-C blowers solve the problem of oxygen control in cupola operation by automatically delivering more or less air, as required, without the necessity of blowing off to atmosphere, as with positive pressure blowers.

With A-C blowers, a metered amount of oxygen enters the cupola; you get a uniform temperature and greater uniformity in composition of the metal.

NOTE FEATURES OF A-C BLOWERS!

▶LIGHT WEIGHT requires simple foundation. Close coupled design makes them compact.

▶SIMPLE CONSTRUCTION with one moving part, the impeller, usually "overhung" on the motor shaft — supported by motor bearings.

▶ONLY MINIMUM MAINTENANCE needed to operate A-C blowers with original efficiencies every day for years! Cast casings give long life impossible with fabricated construction.

Specify A-C blowers for new cupola installations or replacements! For more information, call your A-C Sales Office or write direct.

ALLIS-CHALMERS, 1032A SO. 70 ST.
MILWAUKEE. WIS.

Foundromatic and *Regulex* are Allis-Chalmers trademarks.

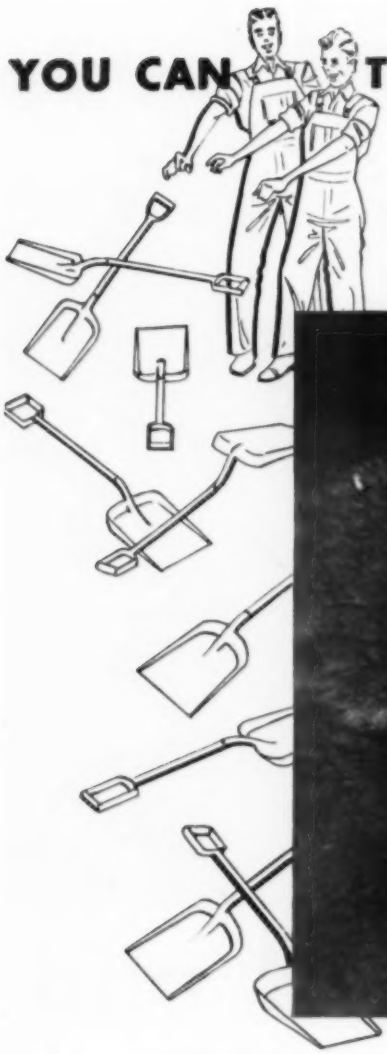
ALLIS-CHALMERS

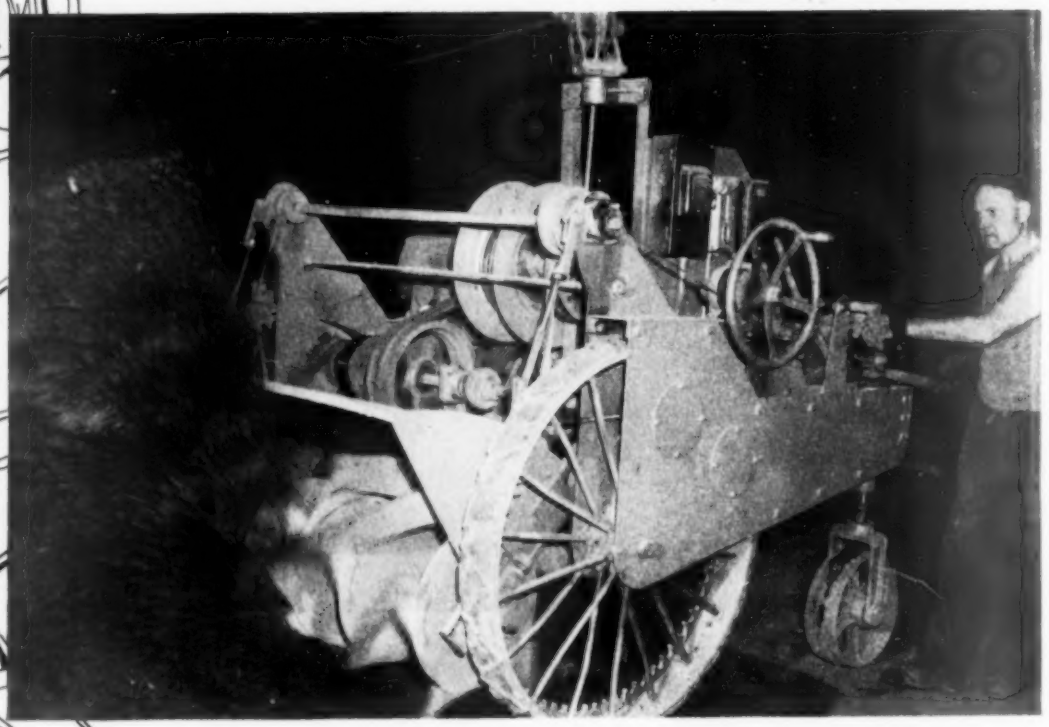
A-2790

Foundry Equipment for Bigger Output-Better Working Conditions!

YOU CAN THROW AWAY YOUR "CRUTCHES"

when you have a SANDCUTTER





It is no longer necessary for foundry production to limp along on a shovel. The many limitations and the back-breaking work of conditioning sand by hand-shoveling belong with the past.

When the whirling, churning blades of the Sandcutter go into action, the sand is thoroughly mixed and aerated as it is thrown into the air and tossed from side to side, leaving it perfectly tempered . . . loose . . . soft . . . fluffy . . . and cool.

After the sand has been cut through, the entire heap can be piled beside the molding machine or between benches. This action, in moving the pile forward, gives the sand several additional cuttings.

The condition of sand cut with a Sandcutter is unexcelled. It can be prepared in accordance with individual requirements for moisture, bond and permeability. It riddles fast, rams easily and vents perfectly.

Join the many foundries that are "throwing away their crutches" and you, too, will be able to say:

"We are able to save about $18.00 per day in the cost of cutting our sand over the hand method".

"Our sand cutting cost compared with the hand method is about 33% less."

"If we had to ge back to hand cutting, our costs would be increased by several thousand dollars a year".

Write for Complete Catalog

The "American Line" catalog illustrates and describes every Sandcutter model as well as all other American Products. Send for your free copy today.

American Sandcutters

AMERICAN WHEELABRATOR & EQUIPMENT CORP., 505 S. Byrkit St., Mishawaka 2, Ind.

BETTER CASTINGS...DIRECT SAVINGS quickly pay for COLEMAN core and mold OVENS

● **REDUCE YOUR OPERATING COSTS** by replacing obsolete, inefficient core and mold ovens with Coleman Ovens. Why waste money using worn-out ovens? Install Coleman Ovens which quickly pay for themselves through immediate direct savings—savings which start in the core room and molding department and end up with perfect castings! It will pay you to investigate Coleman Ovens today because of these vitally important cost-saving advantages:

DEPENDABLE BAKING AND DRYING. All guesswork in core baking and mold drying removed. Rejects and make-overs eliminated.

INCREASED LABOR SAVING. Efficient and modern mechanical designs reduce handling and other indirect labor to a minimum.

HEAVY DUTY CONSTRUCTION. Responsible for dependable performance, economical operation, and minimum maintenance cost.

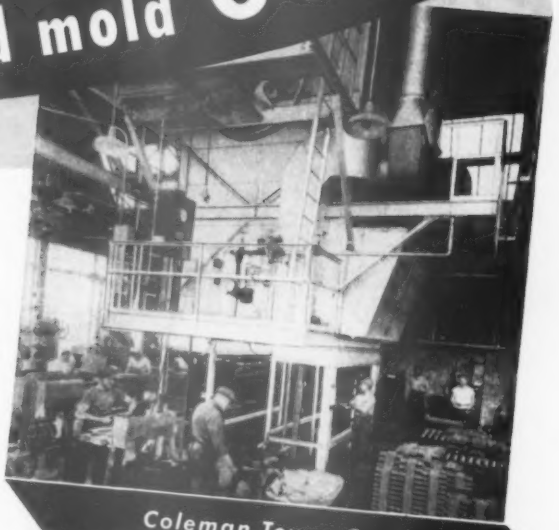
MAXIMUM FUEL ECONOMY. Coleman Heating Systems use the most economical fuel available to you—gas, oil, stoker-coal, electricity, etc.

BETTER WORKING CONDITIONS. Positive ventilation built into Coleman Ovens prevents leakage of fumes and gases—helps to make the core department a better place to work.

COMPLETE RANGE OF TYPES AND SIZES to meet every need.

ADVANCED OVEN KNOW-HOW. Coleman Engineers have pioneered and developed the most efficient foundry oven designs. We will gladly study your operating conditions and recommend the type of Coleman Oven that will do your work at the lowest cost for fuel and labor.

Write today for Bulletin 48



Coleman Tower Oven

Coleman Transrack Oven

Coleman Car-Type Oven

Coleman Rolling Drawer Oven

THE FOUNDRY EQUIPMENT COMPANY

1831 COLUMBUS ROAD CLEVELAND 13, OHIO

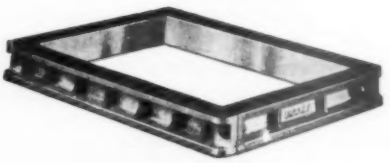
World's Oldest and Largest Foundry Oven Specialists

OVER 10,000 SUCCESSFUL INSTALLATIONS

Partners in Production

Adams 12"-38"
Jolt Squeezer
Portable Type

ADAMS
MOLDING MACHINES and CUSTOM-BUILT FLASK EQUIPMENT



HERE are the "Partners" that keep production rolling and costs low . . . help you meet today's increasing competition with *faster* production of *better* castings at lower cost.

Adams Molding Machines are designed by experienced foundrymen to solve your production problems . . . to give you the speed, power and durability for consistently large output day after day. Close control of jolting and squeezing operations means accurate, uniform molds. Smooth, easy operation, with minimum working parts, simplifies operation and maintains steady, high output levels.

Adams Flasks are custom built to your exact specifications for superior performance and economical production.

Get these "Partners" on your production team now! Write for full information. THE ADAMS COMPANY, 700 Foster Street, Dubuque, Iowa.

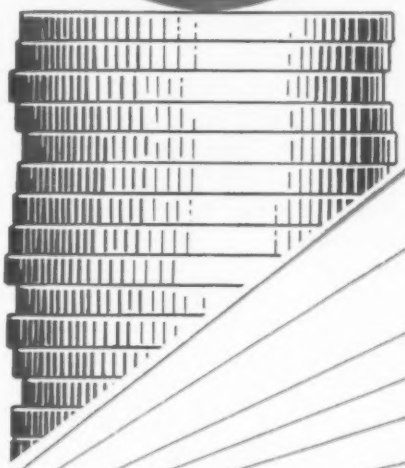
The ADAMS Company

ESTABLISHED 1883

MOLDING MACHINES and FLASK EQUIPMENT

DUBUQUE, IOWA, U.S.A.

Hercules TRULINE BINDER *Cuts Core Room Losses*

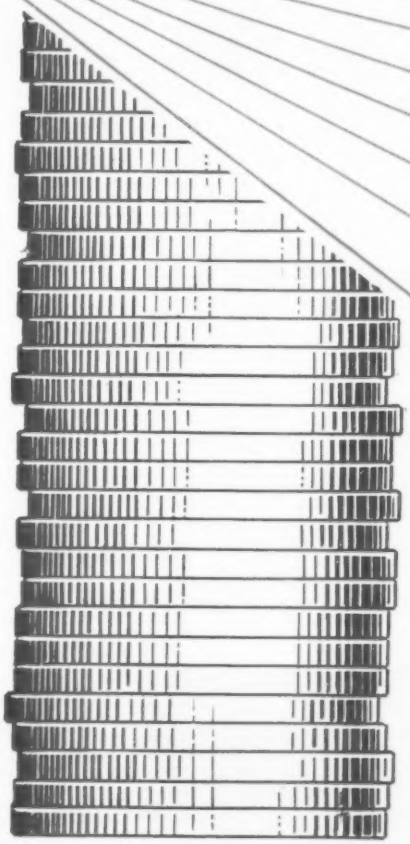


IN STEEL FOUNDRIES
using Silica Flour, Bentonite, or Fireclay...

- "TRULINE" REPLACES CORE OIL
- MAKES MORE UNIFORM CORES
- GIVES SAME PHYSICAL PROPERTIES
- UP TO 25% FASTER BAKING
- SOUNDER, TRUER CASTINGS

IN IRON FOUNDRIES
using Pitch-compound Mixes...

- "TRULINE" ELIMINATES PITCH
- GIVES STRONGER-HANDLING CORES
- EASIER-COLLAPSING CORES
- UP TO 50% LESS CLEANING TIME
- FEWER CRACKED CASTINGS
- CLEANER CASTINGS
- ELIMINATES SCABS



32-page book gives details. Send for copy today.

HERCULES POWDER COMPANY
INCORPORATED
920 King Street, Wilmington 99, Del.

"TRULINE" IS REG. U. S. PAT. OFF.

HF9-1

Want User Benefits in Protection? Style? Comfort?

. . . THIS AO METAL SPECTACLE GOGGLE HAS THEM ALL!

Yes, the AO F-3100 Metal Spectacle Goggle gives workers "all three" *plus* unobstructed view of the work! Specify this proved preventer of eye accidents (and their high costs). Side shields give added protection when there is also exposure to particles striking from the side. Your nearest AO Safety Products Representative can supply you.

FEATURES:

- High-set end pieces take hinges and temples out of line of sight for unobstructed vision. High position of end pieces also keeps goggles up on nose for smart appearance.
- Double-braced bridge for exceptional structural strength.
- Orbit shape of lenses conforms to eye. Close fitting frame for maximum protection.
- Universal pivot support permits nose pads to adjust to sides of nose. Large size pads distribute pressure over greater area for comfort.
- Temples are insulated, perspiration proof, heat resistant.
- Side shields (when specified) are perforated, wire mesh, non-corrosive, easily cleaned and provide ample air circulation.
- Six Curve Super Armorplate clear or Calobar lenses in medium, dark or extra dark shades.
- Sizes: 42 mm., 44 mm., and 47.7 mm.; 21, 23, and 25 mm. bridge sizes.

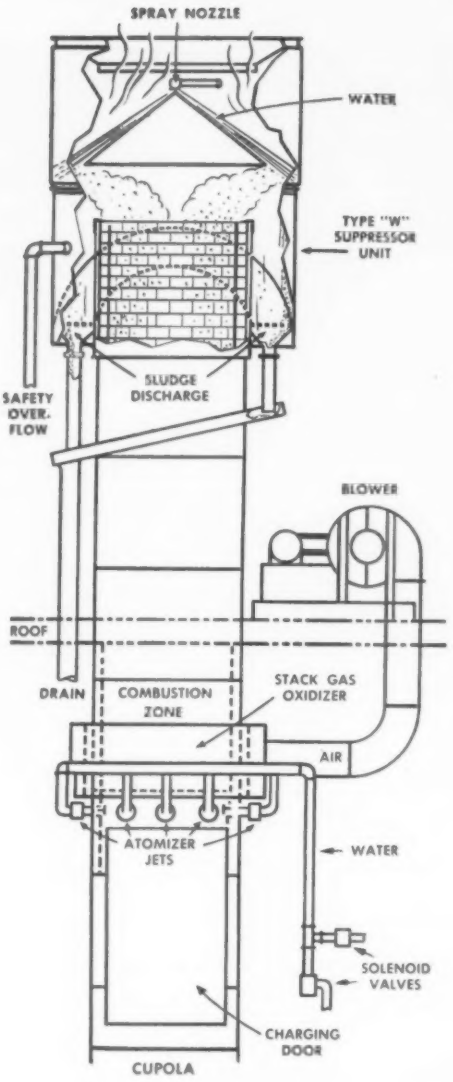
American Optical Company
SAFETY PRODUCTS DIVISION

Southbridge, Massachusetts • Branches in Principal Cities

Here is the

Cupola Dust and Spark Suppressor

you have waited for



Now it is easy to be a "good neighbor"—to eliminate the smoke, fly ash, and sparks from your cupola—to comply with rigid city ordinances. Whiting Hydro-Clone Type "W" Dust and Spark Suppressor is sturdy, compact, and simplified in design. It costs less to install, operate, and maintain.

Unburned particles, fly ash, cinders, iron oxide, etc., are effectively removed by a high-velocity, evenly distributed stream of water covering the area between the edge of the deflector cone and the outer shell.

The resulting slurry washes down the inner wall of the suppressor to twin discharge drains, and into a settling tank. Sludge may be removed manually, automatically, or drained into a wet slagging system. When treated to overcome acidity, the water may be recirculated.

When the Stack Gas Oxidizer and Flame Suppressor Unit is applied, carbon monoxide and unburned carbon particles are burned, reducing the density and color of the smoke discharged into the atmosphere. By suppressing flames, temperatures are reduced and life expectancy of the Type "W" Suppressor is increased. Where flames are not excessive, the atomizer jets can sometimes be omitted, reducing the cost of the installation.

Bulletin FY-158 fully describes the new Type "W" Hydro-Clone. Write for your copy, today.

WHITING
CORPORATION

15607 Lathrop Ave., Harvey, Illinois

Offices in Chicago, Cincinnati, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, and St. Louis. Agents in other principal cities. Canadian Subsidiary: Whiting Corporation (Canada) Ltd., Toronto, Ontario. Export Department: 30 Church St., New York 7, N. Y.

"IRONTON NOJOINT" for Foundry Ladles

IRONTON
Foundry Representatives

The Ironton Fire Brick Co.
Ironton, Ohio

The Ironton Fire Brick Co.
Box 4728
Jacksonville 1, Fla.

Beeman Sales & Engr. Co.
641 Buhl Bldg.
Detroit 26, Mich.

Earl A. Swenson
Box 651
Columbus 16, Ohio

Firegan Sales Co.
141 W. Jackson Blvd.
Chicago 4, Ill.

Henry M. Witmyer
1311 Proctor St.
Baltimore, Md.

Pa. Foundry Supply & Sand Co.
Ashland & East Lewis Sts.
Philadelphia 24, Pa.

M. D. Lucas
2116 Keith Bldg.
Cleveland 15, Ohio

Frederic B. Stevens, Inc.
93 Stone Street
Buffalo 12, N. Y.

Carl F. Miller Co., Inc.
1217 Sixth Ave. So.
Seattle 4, Washington

Klein-Farris Co., Inc.
683 Atlantic Ave.
Boston 11, Mass.

Interstate Supply & Equip. Co.
647 W. Virginia St.
Milwaukee 4, Wisc.

V. C. Shadden
Box 935
Chattanooga, Tenn.

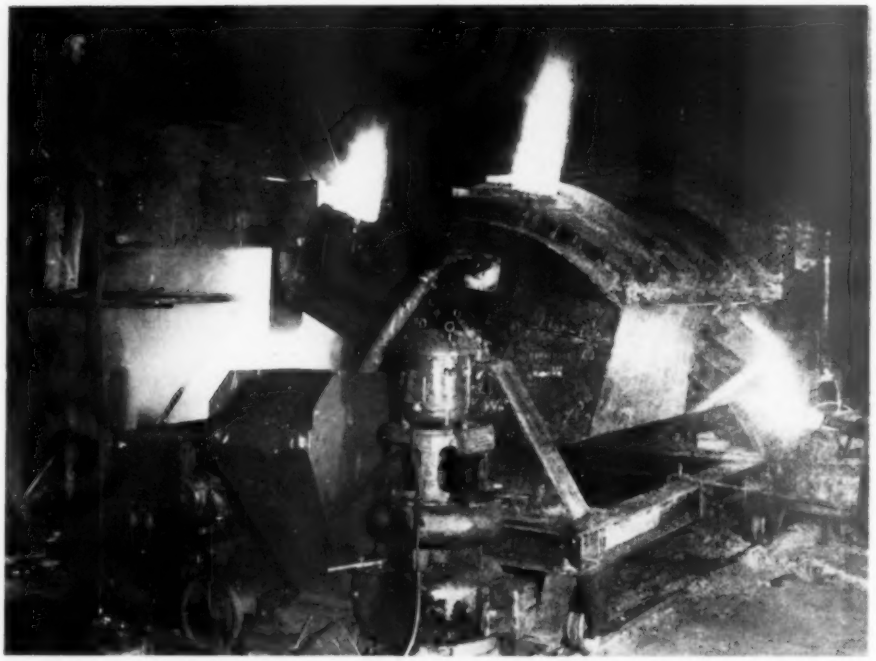


Photo Courtesy—Whiting Corporation

"Ironton Nojoint", special type plastic ramming refractory is giving unusually fine service in these new heated desulphurizing and mixing ladles. It gives considerably longer service than any type of fire brick or special shape lining, due to the solid, dense, monolithic lining being so resistant to soda slags.

"Ironton Nojoint" is economical to use and is quickly and easily installed. Our service engineers will be glad to help you.

Ask us for complete information on "Ironton Nojoint".

THE IRONTON FIRE BRICK COMPANY
RELIABLE REFRACTORIES
IRONTON OHIO

LINE-UP TROUBLES DISAPPEAR

with UNIVERSAL FLASK PINS AND BUSHINGS FOR COPE AND DRAG

Accurate and speedy lineup of cope and drag, saving valuable production minutes, is the experience of the foundry that uses Universal Flask Pins and Bushings. Once installed, they *maintain their stability and accuracy* for hundreds of castings. Cope Bushings are quickly guided to Drag Pins over tapered, loose-fitting Closing Pins which are easily removed after assembly. The special elongated flask bushing permits longitudinal expansion to compensate for metal heat *without affecting accurate alignment.* Universal Flask Pins and Bushings are available from stock in standard sizes for iron, steel, aluminum and magnesium flasks. Special sizes and types to order. Send for folder and complete information.

UNIVERSAL ENGINEERING COMPANY

FRANKENMUTH 4, MICHIGAN

Presenting the New

An Anti-Piping Compound So Revolutionary in Its Advanta and Accomplishments That Its Use Op a New Era of Quality Production a Savings for Foundrymen!

With the use of CASTFLUX SB-10 SMOKE and FUME, for the first time, are practically eliminated.

CHURNING under most conditions can now be overcome.

A positive saving in "REMELT" RISER or HOT TOP METAL can now be effected through "SHORT" pouring.

Tests made in the field show this saving varying from 10% to 30% in both IRON and STEEL.

SB-10's outstanding "INSULATING PROPERTIES have established that 25% LESS WEIGHT material is required for effective results in any application.

SB-10 keeps RISER METAL HOT AND LIQUID for periods of 100% to 200% LONGER.

CASTFLUX TYPE SB-10 sells at NO INCREASE in Price.

NATIONAL PIGMENT CO

Type SB-10

...FLUX
Trade Mark Reg.

...tages
...Opens
...n and

In The Ladle, FLUIDITY Is Materially Increased PURIFYING the Metal.

CASTFLUX TYPE SB-10
Also Gives You
CLOSER GRAINED CASTINGS, FEWER REJECTS, FEWER MISS RUNS, LESS REMELTING, LONGER LADLE LIFE, LESS LADLE CHIPPING

at a cost of
10¢ to 15¢
per ton of metal treated

It took 5 years of development and research to perfect SB-10.

Foundrymen, in whose plants SB-10 has been tested for months consider it the most efficient anti-piping compound on the market. It is sold with this

Unconditional Guarantee

Unless Castflux Type SB-10 meets with your full approval material can be returned, provided we are notified within 30 days after receipt of material.

Write for Complete Details and Prices

...COMPANY
2115-2117 EAST YORK STREET,
PHILADELPHIA 25, PENNA.

Ridiculous-sure . . .

BUT YOUR DUST CONTROL SYSTEM COULD BE EQUALLY INEFFICIENT

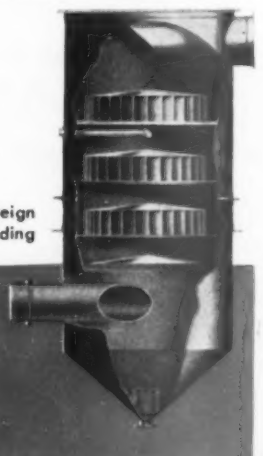
Naturally a charwoman is out of place in the foundry . . . but so is obsolete dust and fume control equipment.

If your personnel problems are mounting . . . your efficency down . . . production costs up . . . look out into your foundry . . . can you slice the air with a knife? If so—there's your answer . . . poor foundry ventilation.

Schneible engineers have not only specialized in Dust and Fume Control equipment but pioneered important new developments in Foundry Ventilation Control.

It will pay you to call us in on your problem. A Schneible representative is as close as your telephone.

MULTI-Wash COLLECTORS
Model HC—1500 to 30,000 c.f.m. or multiple units for larger capacities.
Model JC—1000 to 30,000 c.f.m. or in multiple units, if greater capacity desired.



U.S. and Foreign Patents Pending

CLAUDE B. SCHNEIBLE COMPANY
P. O. BOX 502 • DETROIT 32, MICHIGAN

SCHNEIBLE

"A Stitch in Time..."

applies to molding machines, too!

A molding machine with badly worn parts is a millstone tied to production. In the interests of good foundry housekeeping—to protect investment and insure efficiency—*now* is the time to check over those Tabor machines with long production records in back of them.

Use *Tabor's 3-point rebuilding program* to save yourself a lot of money and to stop bad work dead in its tracks:

1. Write, wire or phone for a Tabor representative to make a scheduled call at your foundry.
2. Then make a joint inspection of your Tabor equipment. This is bound to work to your benefit, even if machines are in tip-top shape.
3. Plan corrective steps. Parts needed for any minor repairs can be ordered on the spot. Or the equipment can be brought into Tabor's plant—then rebuilt for many more years of unfailing duty. Or, where economics justify, new-machine replacements can be made from Tabor stock.

While checking, don't overlook the *tremendous trifles*—vibrators, air line lubricators and filters—and those leaky valves that cost so much in wasted air.

Let's team up now to give you fullest value for your upkeep dollar.

REPRESENTATIVES
Snyder Foundry Supply Company, Los Angeles, Calif.; The PacificGraphiteCompany,Inc., 40th & Linden Sts., Oakland 8, Calif.; Carl F. Miller & Company, Seattle, Washington; M. W. Warren Coke Company, 1017 Olive Street, St. Louis 1, Mo.; E. R. Frost Company, Inc., Minneapolis 14, Minn.; Harry H. Reich, Trussville, Ala.

MANUFACTURERS ASSOCIATION INC. FOUNDRY EQUIPMENT

The TABOR *Manufacturing Co.*

SINCE 1884 MANUFACTURERS OF FOUNDRY MOLDING MACHINES
6225 TACONY STREET • PHILADELPHIA 35, PENNA.

67 Years'

Cumulative Experience in Making

PIG IRON

In any field, experience is a valuable factor. Producing pig iron is no exception. The modern Woodward pig—dependably uniform in shape, size and analysis—is a product of evolution. Into the making of the modern Woodward pig has gone the cumulative experience of 67 years' unceasing effort to improve quality.

WOODWARD IRON COMPANY

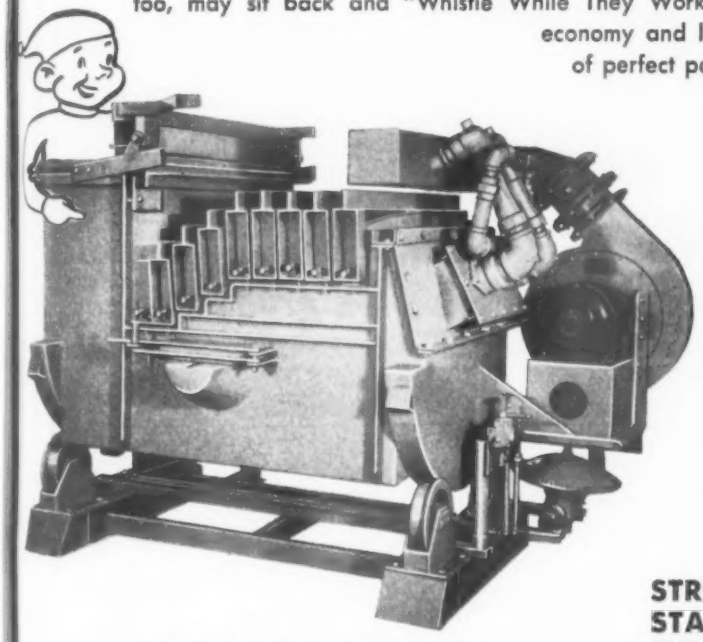
WOODWARD, ALABAMA

Independent Since 1882

GENERAL SALES OFFICES: 1515 First National Building • Birmingham, Alabama • Phone 4-6786

YOU can whistle . . . while THEY work!

Here are a few furnaces that are now being used by many of the leading organizations in the foundry, die casting and permanent mold industries throughout this country of ours. They have done their respective jobs well! The fact is, when you install a Stroman Furnace for any non-ferrous metal melting job, you too, may sit back and "Whistle While They Work," for their efficiency, economy and longevity are your assurance of perfect pours, every time, at lowest costs.



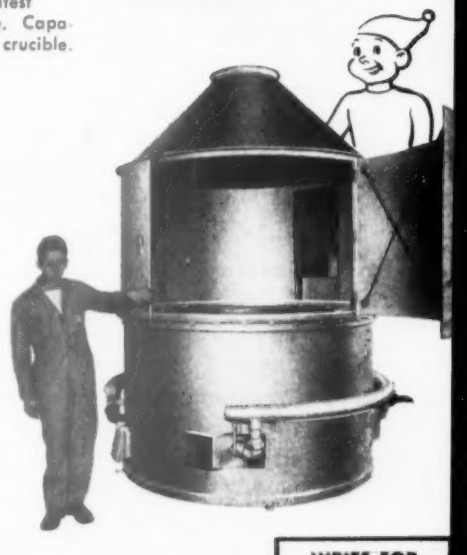
STROMAN CRUCIBLE STATIONARY MELTING FURNACES

For Brass, Bronze, Aluminum and other non-ferrous metals. Sturdy, efficient and featuring the Stroman Push-Back Cover these stationary furnaces are designed for peak production and greatest fuel economy. Oil or Gas Fire. Capacities from No. 20 to No. 400 crucible.

ECONOMELT FURNACES

The Best Direct Fired Reverberatory Melting Furnace on the market! Its speed in melting Brass, Bronze, Grey Iron or Aluminum is unmatched! Continuous charging . . . with cold metal never reaching the molten bath, makes it practically a continuous pour furnace . . . and it will show upwards of 40% in fuel cost savings. Oil or gas fire. Also can be furnished with combination oil, gas burner. Capacities (Brass) up to 2000 lbs. Write for Bulletin No. 635 for full information.

STROMAN IRON POT STATIONARY MELTING FURNACES

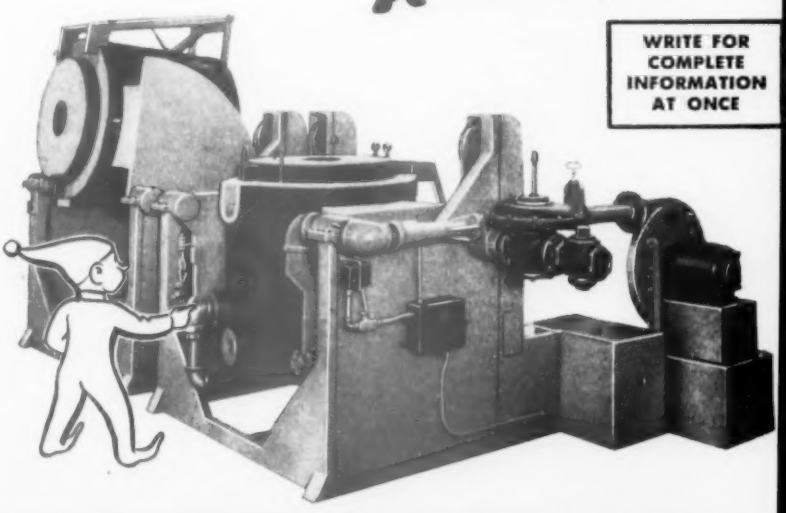


These furnaces are highly recommended as break down furnaces for zinc die casting plants. They also excel as aluminum holding furnaces. They can be supplied with or without hoods to exhaust fumes and heat. Their construction assures longest pot life and lowest fuel costs. Choice of manual or automatic controls and gas or oil fire. Capacities from 212 to 14,000 lbs. of zinc.

WRITE FOR COMPLETE INFORMATION AT ONCE

STROMAN MECHANICAL OR HYDRAULIC TILT CRUCIBLE MELTING FURNACES

For Brass, Bronze, Aluminum and other non-ferrous metals. Stationary Lip Pour assures a constant pouring arc, eliminating the necessity of moving the ladle at any time during a pour. They are excellent for use in permanent mold and die casting plants as well as any foundry. Their sturdy construction assures longest life, and their economical operation results in lowest production costs. Oil or gas fire. Built in sizes to handle capacities from No. 125 to No. 400 crucible.



STROMAN FURNACE & ENGINEERING CO.

DIVISION OF

THE PETERSEN OVEN CO. • 9900 FRANKLIN AVE. • FRANKLIN PARK, ILL.

Volume increased by complete mechanization

No lost motion from cupola to finished product

These three views were taken in a recently-modernized Malleable Foundry . . . Jeffrey-equipped for non-stop production. Here is sand and casting handling at its best. We would like to tell you more about it.

Jeffrey Mold Conveyors, Trolley Conveyors, Belt Conveyors, Steel Apron Conveyors, Continuous Molding Stations and Electric Vibrating Feeders . . . all contribute to the success of this high-speed foundry operation. Write for more details . . . if you are looking for peak efficiency and increased volume.

THE JEFFREY MANUFACTURING COMPANY

ESTABLISHED 1877

907 North Fourth St., Columbus 16, Ohio

Baltimore 2 · Birmingham 3 · Boston 16 · Buffalo 2 · Chicago 1 · Cincinnati 2 · Cleveland 13 · Denver 2 · Detroit 12 · Huntington 19 · Houston 5 · Jacksonville 5 · Milwaukee 2 · New York 7 · Philadelphia 3 · Pittsburgh 22 · St. Louis 1 · Salt Lake City 1 · Scranton 3

Complete Line of Material Handling, Processing and Mining Equipment

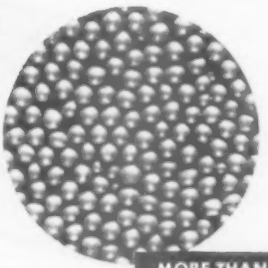
JEFFREY MFG. CO., LTD., Head Office and Works, MONTREAL

For Uniform, Low Cost, Efficient Blast Cleaning

When you buy shot and grit, you buy a promise of uniform, low cost, efficient blast cleaning or peening. Your confidence in the material ordered should be based on actual use, rather than recommendation or reputation. Its true value to you can only be determined by a thorough test in your equipment, on your job.

To all outward appearances, most shot and grit may appear to be the same—but, that's where the similarity ends. Where Hi-Grade Shot and Grit are concerned, you'll find there IS a difference . . . a value far beyond purchase price that pays out in extra performance on *your* job. Hi-Grade Shot and Grit is *quality-controlled* from molten metal to finished product. Order a trial quantity today. Let results convince you *Hi-Grade is best by test.* That's the only practical and profitable way to buy abrasives.

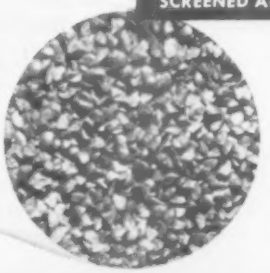
PACKED IN 100 LB. BAGS
READY FOR IMMEDIATE SHIPMENT



HI-GRADE SHOT
UNIFORM SIZE AND HARDNESS

Withstands repeated strain, stress and wear. Famous for its lack of hollows, tails, irregular shapes. Exclusive alloying and tempering process helps prevent rust; minimizes impact fractures.

MORE THAN MEETS S.A.E. SPECIFICATIONS
SCREENED AND GRADED FOR 100% USAGE



HI-GRADE GRIT
SHARP, TOUGH AND DURABLE

Made of same material and processed by same methods as Hi-Grade Shot. Free from dust fines and scale. Cleans with maximum efficiency. Easy on equipment—reduces wear and maintenance costs.

Clayton-Sherman *Abrasives Company*

MANUFACTURERS OF *QUALITY-CONTROLLED* SHOT AND GRIT

Representatives in Principal Cities

3896 LONYO ROAD ★ DETROIT 10, MICHIGAN

ROBINSON

CAS-TO-FIT
CASTABLE REFRACTORY

FLINT-CAST
SUPER-DUTY CASTABLE

ELIMINATE REPAIR DELAYS!

Mold special shapes right in your own plant. No costly waiting for special shapes to be made and delivered! Burner blocks, door tile, dampers, baffle tile — any special refractory shape quickly and easily formed with Robinson Castables! Robinson Castable Refractories are ideal for all types of furnace repairs — they're easily mixed to any convenient consistency for ramming, lining small furnaces, forming hearths for domestic stokers, oil burner work, or for pouring into forms, as is necessary in different types of baffle work.

Hydraulically setting, Robinson Castable Refractories do not require the application of heat to set. Extremely high working ranges (3,000° F. for Flint-Cast, 2,650° F. for Cas-To-Fit) insure longer furnace life with more heats. Carefully compounded formulae with calcined bases give Flint-Cast and Cas-To-Fit unusual strength and hardness under the most severe furnace conditions. High resistance to flash temperatures and sudden changes in temperature mean longer service — less downtime — more production!

Manufactured and shipped in dry form in moisture-proof sacks, Robinson Castables eliminate the danger of "setting up" in the containers. This convenient form also allows mixing of Flint-Cast and Cas-To-Fit to the desired consistency for your own particular application, whether it be pouring, moulding, or ramming.

R-248-7

NEW ROBINSON USEFUL REFRACTORIES DATA

A handy bulletin to have around. Send for your free copy—you'll use it every day! Just drop a line to The Robinson Clay Product Company, Akron 9, Ohio.

THE ROBINSON CLAY PRODUCT CO.
AKRON 9, OHIO

ROBINSON ENGINEERED REFRACTORIES

Silica Brick, Fire Brick, Plastic Fire Brick, Castable Refractories, Acid-Proof Cement, High-Temperature Bonding Mortar, Fire Clays.

FOR ENDURANCE AND LONG LIFE BUY SPO MOLDING MACHINES

Thanks to SPO's Inverted Jolt Feature..

You Can't Beat the No. 200 Series for making Cope and Drag Molds

SPO No. 2222 Jolt - Squeeze - Strip Machine.

All machine operations are performed by sequence-arranged push buttons. Jolt-squeeze and vibrator operations are timer-controlled. Power-operated squeeze head can be adjusted easily to swing left or right, and is air-locked in both forward and back positions. Husky head construction reduces squeeze board end twist or spring.

Table size . . . 36" x 51".
Jolt capacity . . . 2500 lbs.
Squeeze capacity . . 28,000 lbs.
Pattern draw . . . 12"

SPO's inverted jolt feature is a definite contribution to the design and performance of modern molding machines. In hard, continuous, thumping use—day in and day out—this exclusive SPO development consistently turns out more good, accurate molds at a uniformly lower cost. You profit, too, from a new low in maintenance, with a corresponding new high in service and endurance. Write for all the facts about the SPO No. 200 Series, rapid-fire producers of both cope and drag molds.

Always find out first what SPO has to offer.

SPO

INCORPORATED

Manufacturers and Specialists in Molding Machines, Vibrators and Patterns for Production

7500 GRAND DIVISION AVENUE • • CLEVELAND 5, OHIO

WORLD-FAMOUS SCHWINN-BUILT BIKES are known for high-quality workmanship. 3M Abrasive Belts give superior finish to frame members, other internal parts.

GROOVED BUFF CONTACT WHEEL permits easy polishing of contours on tough crank forgings. 3M Abrasive Belts give smoother finish in half the time of former methods.

Schwinn Saves $42,000!

Finishing costs cut 50% on just one of several belt grinding operations

Finishing costs on bicycle crank forgings dropped from 14¢ to 7¢ per unit when Arnold Schwinn & Co., America's largest bicycle manufacturer, converted to belt grinding. 3M Abrasive Belts give faster rough cutting, finer finishing, save $42,000 a year on this one operation alone.

3M Methods Engineers are trained to analyze your production problems in rough grinding or finishing of metals, wood, glass, or plastic. They can show *you* savings . . . increase the quality of your workmanship. Write today for complete information.

MAIL COUPON FOR FREE BOOKLET full of money-saving shortcuts for your grinding and finishing operations.

Address: Minnesota Mining & Mfg. Co., St. Paul 6, Minn.

☐ Please send me a copy of your "Step Up Production" booklet.

☐ Please send a 3M Methods Engineer to call on us.

By.....

Firm.....

Address.....

City.....*Zone*.....*State*..... F119

3M® ABRASIVE BELTS

Made in U.S.A. by **MINNESOTA MINING & MFG. CO.** St. Paul 6, Minn.
Also makers of "Scotch" Brand pressure-sensitive tapes, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-Slip Surfacing, "3M" Adhesives

General Export: DUREX ABRASIVES CORP., *New Rochelle, N. Y.* • *In Canada:* CANADIAN DUREX ABRASIVES LTD., *Brantford, Ontario*

. . . in the foundry also

things are changing!

Progress means change, in the foundry as elsewhere. Competition sets the pace. Many light and heavy castings made for machine parts and various other uses, now have to compete with different methods of manufacture. Skills, judgment, and readiness to take advantage of new knowledge are demanded at such a time. A foundryman who is aware of the challenge needs to be well acquainted with the benefits of Molybdenum, Tungsten, and Boron in making better, stronger cast irons and steels.

The Molybdenum Corporation offers literature and employs a technical staff that can perhaps be helpful. Correspondence is invited.

AMERICAN Production, American Distribution, American Control, Completely Integrated.

Offices: Pittsburgh, New York, Chicago, Cleveland, Detroit, Los Angeles, San Francisco, Seattle.

Sales Representatives: American Steel and Supply Co., Chicago; Edgar L. Fink, Detroit, Brumley-Donaldson Co., Los Angeles, San Francisco, Seattle.

Subsidiaries: Cleveland-Tungsten, Inc., Cleveland, O.; General Tungsten Manufacturing Co., Inc., Union City, N. J.

Works: Washington, Pa.; York, Pa.

Mines: Questa, New Mexico; Urad, Colorado

MOLYBDENUM CORPORATION OF AMERICA
GRANT BUILDING PITTSBURGH, PA.

MCA

UNITED STATES ELECTRICAL TOOLS

FOR LOWEST COSTS IN FOUNDRIES LARGE OR SMALL

PROVED QUALITY

PROVED ECONOMY

PROVED PERFORMANCE

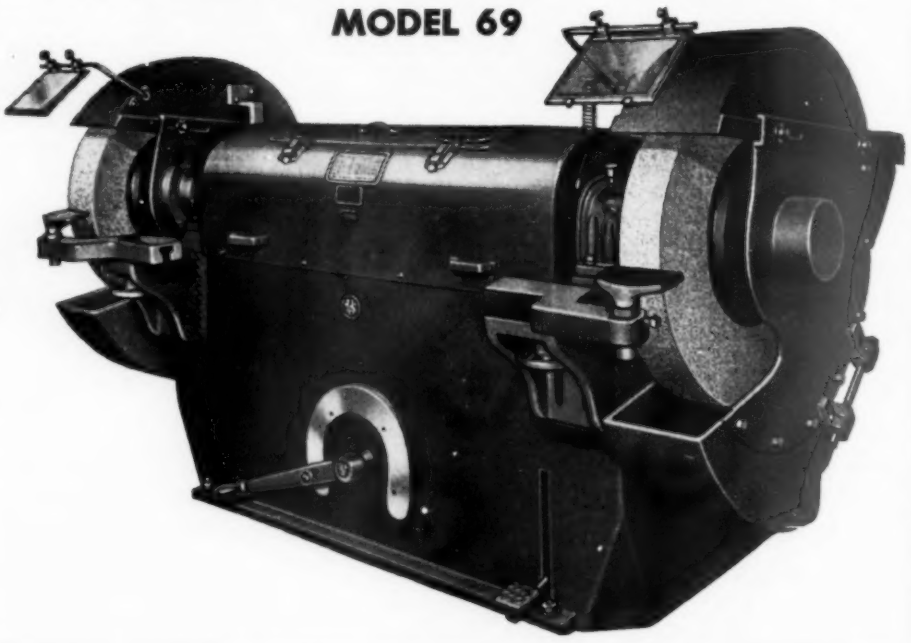
America's most complete line of electrical tools is precision-designed and precision-produced for positive performance speedily and efficiently. You are assured of maximum savings in time, labor and costs.

ADJUSTABLE SPEED SNAGGING GRINDER

For heaviest type production grinding where more power is required than on the average production job. Equipped with semi-enclosed, constantly lubricated four-speed drive transmission enabling operator to maintain efficient peripheral speed for the full life of the wheel. The speed lever is interlocked with guards which makes it impossible to increase speed unless wheels are worn down sufficiently to justify speed change. Electric interlock prevents operation of machine unless gears are in mesh.

FOUR SPEED CHANGES... FOR VITRIFIED OR HIGH SPEED WHEELS ...WHEEL GUARDS ADJUSTABLE TO WHEEL WEAR

MODEL 69

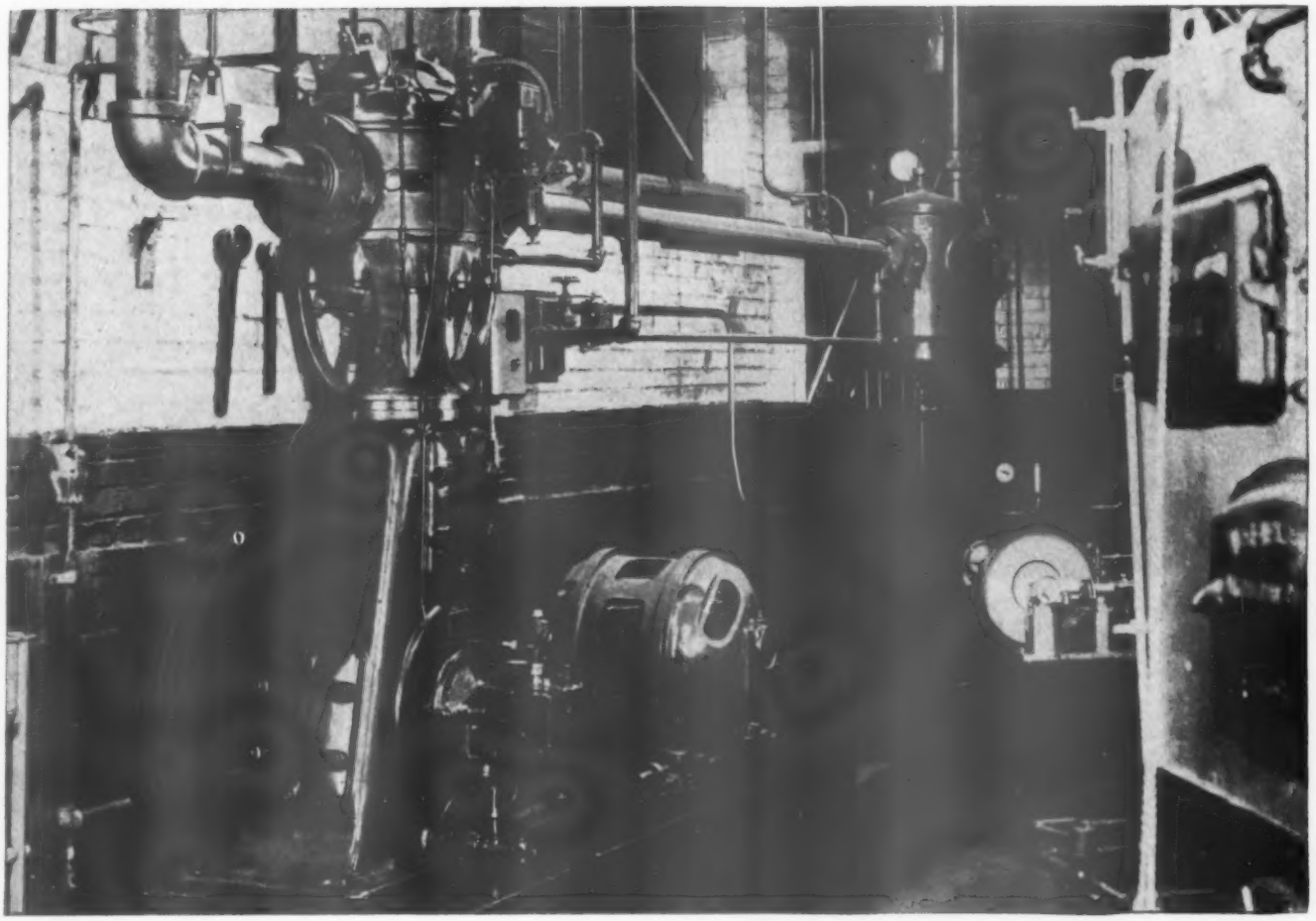


IN STOCK AT YOUR JOBBER

Drills
Grinders
Surfacers
Polishers
Sanders
Tappers
Hole Saws
Buffers
Flexible Shaft machines and many other tools

The **UNITED STATES ELECTRICAL TOOL** *Co.*

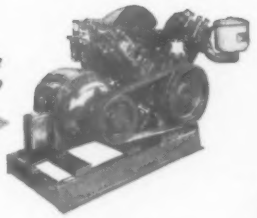
CINCINNATI, OHIO



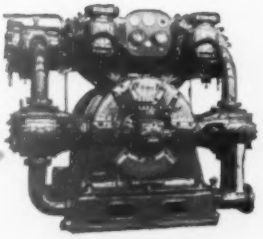
SAVE VALUABLE SPACE WITH THE EFFICIENT

JOY WG-9 HEAVY DUTY AIR COMPRESSOR

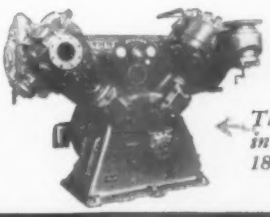
The vertical design and small base of the JOY WG-9 Compressor mean great savings in valuable floor space. Built in eleven sizes from 153 to 822 CFM, the WG-9 is designed for continuous heavy-duty service... features the exclusive JOY "Dual-Cushion" valves for top efficiency and lowest-cost operation. ●JOY builds the most modern compressors available for either centralized or decentralized air supply—*write for Bulletin.*



The JOY WL-80, in nine sizes from 81 to 590 CFM.



The JOY WN-114, in single or twin units from 1092 to 7312 CFM.



The JOY WN-112, in sizes from 378 to 1828 CFM.

Consult a Joy Engineer

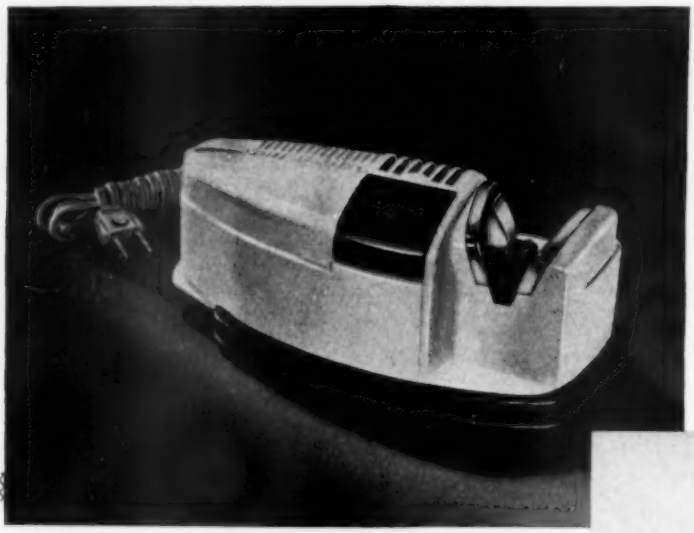
W&D 12049

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

ANOTHER DIE CAST PRODUCT MADE BETTER ON KUX DIE CASTING EQUIPMENT



Die Castings MADE ON KUX MACHINES

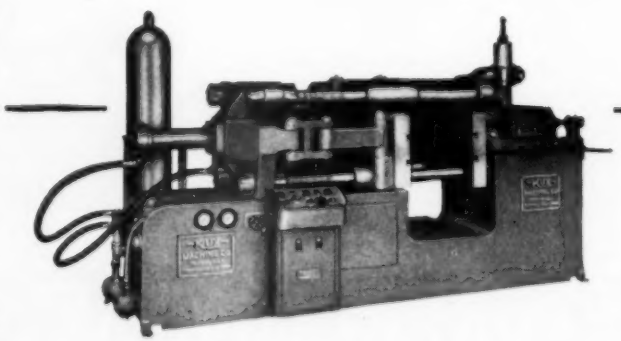
BOOST CONSTRUCTION EFFICIENCY
IN THE MANUFACTURE
OF THE new Cory

ELECTRIC KNIFE SHARPENER

To add to this product's unique, knife-sharpening efficiency, die castings equally functional and sales-attractive are used. The choice of KUX Machines for the production of these die castings was a natural one.

Many other leading manufacturers have learned to rely on modern KUX machines . . . for substantial economies of production . . . improved product appearance . . . superior performance . . . advantages gained from quality die castings made on KUX Die Casting Machines.

There's a machine to solve *your* particular die casting problem! Write for illustrated catalog showing complete line of KUX Die Casting equipment.



MODEL BH-30 ILLUSTRATED

Hydraulically operated die casting machine for production of zinc castings weighing up to 10 pounds.

KUX MACHINE COMPANY
3940 W. HARRISON STREET
CHICAGO 24, ILLINOIS

MERITE
PIG IRON

Highest Quality

MORE USED THAN ANY OTHER MERCHANT PIG IRON

P M

PICKANDS MATHER & COMPANY
UNION COMMERCE BUILDING · CLEVELAND 14, OHIO
CHICAGO · CINCINNATI · DETROIT · DULUTH · ERIE · GRAND RAPIDS · TOLEDO
GREENSBORO · INDIANAPOLIS · MINNEAPOLIS · ST. LOUIS · WASHINGTON

IRON ORE · PIG IRON · COAL · COKE

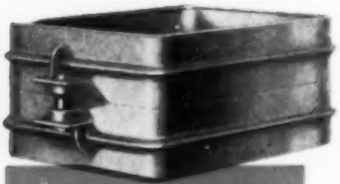
SIXTY-SIX YEARS OF
SERVICE TO INDUSTRY

Sterlings are Built to RIGID SPECIFICATIONS

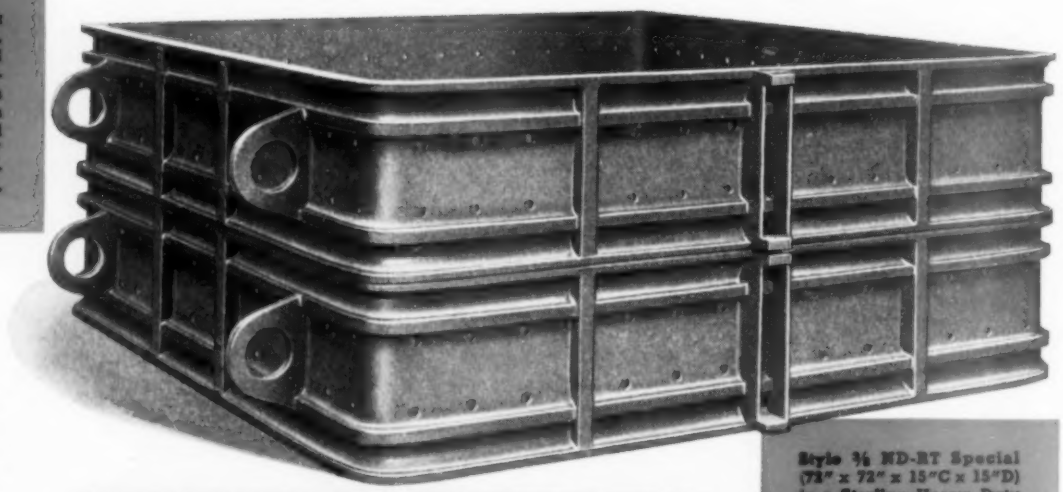
There's a STERLING STEEL FLASK for every type of molding. Whether you need small or large foundry flasks, there are Sterling Steel Flasks to meet your specific job requirements. Every Sterling is constructed to give you a maximum of strength with minimum weight. Even under rough usage, you are assured of obtaining both accuracy and speed in molding. This is possible only because Sterling Steel Flasks are built to rigid specifications according to modern engineering design. They are backed by almost a half century experience fabricating quality foundry flasks. Write for new Sterling Catalog No. 60.

STERLING WHEELBARROW CO., Milwaukee 14, Wis., U. S. A.

TINY BUT TOUGH!



Sterling Style "E" Flask is designed for tough, small and medium sized work. It is especially popular in brass and iron foundries. Available with interchangeable copes and drags having depth of 2½" and up. Built with combination pin lugs and handles.



Style ¾ ND-RT Special (72" x 72" x 15"C x 15"D) is a Sterling Heavy Duty Flask with special reinforcing strips on both cope and drag. Its easy, light handling for a flask this size, makes it particularly practical for use in high-production grey iron foundries.

Consult Sterling when in need of foundry equipment. Send for your copy of Sterling Catalog No. 60, just off the press.

LARGE BUT LIGHT!

MORE THAN 4000 FOUNDRIES USE STERLING FOUNDRY EQUIPMENT

America Can Benefit From British Report

INDUSTRY of Great Britain naturally will be the chief beneficiary of the observations and recommendations contained in the report of its first Productivity Team, covering a study of steel foundries in the United States. Nevertheless, foundrymen of this country—and not alone steel foundrymen—can profit from the report. Probably never before has an industry been given the opportunity to receive as frank and searching an analysis of its methods and equipment from competent observers.

The British report, excerpts from which are presented in this issue starting on page 92, is the product of 16 men whose backgrounds comprise foundry managerial experience, technical knowledge and craftsmanship. The group was unusually thorough in its analysis, indicating what it considered both the good and bad features of American facilities and practices. Consequently, American foundrymen can benefit by heeding the constructive criticism in the report. In addition, the emphasis on those factors responsible for the success experienced by the foundry industry in this country can point the way to further progress.

Of course, the British realized before their visit here that mechanization and standardization of product contribute greatly to high productivity per man-hour in American foundries. These things we take for granted, but we may be less aware of the importance of other factors which the British noted. One of these is the manner in which the results of research work are put to general and practical use. Another is the good to be derived by foundrymen from informal discussion of their common problems.

There is also a lesson in the report for the average workman on what helps to make the American system tick. In an interview after the British Team's return last spring, one of the members was asked, "If the United States worker earns more than the British worker, does he work harder to get it?" His reply was, "He earns more because he has more horsepower at his disposal."

The British put their finger on one of the weak points of the entire foundry industry in discussing cost control. Less than one-half the foundries visited were described as having what the visitors considered satisfactory cost systems. Surprise was expressed that the industry widely adopted technical information disseminated by the Steel Founders' Society of America but made relatively little use of that organization's cost recommendations.

Although the report commented favorably on the neatness of American foundries, a striking difference was noted between the average shop and the outstanding ones. Neglect of window cleaning, with consequent bad effect on illumination, and a dinginess resulting from lack of interior paint were sufficiently apparent in certain instances to bring criticism.

In seeking to benefit from our experiences, the British also have done a service to American foundrymen.

William G. Gude

Managing Editor

THE FOUNDRY—WHEREVER METALS ARE CAST

By FRANK G. STEINEBACH
Editor
THE FOUNDRY

What are Foundries doing about Public Relations

This discussion of the sort of job the foundry industry is doing in the matter of public relations is based on a study made of a representative cross section of the industry. Summary of replies given to various questions asked in the study is shown in the box at the right

REMEMBER way back during the war when foundries were taking quite a beating because nobody seemed to understand the industry's production problems? Do you recall the critical remarks on foundry working conditions which originated in Washington, and were echoed in every city and town during those days of stress? If you were one of those who had to battle for production in the face of crippling shortages of materials and men, you surely will recall the damaging effect of these criticisms.

When the going was tough and it seemed that the foundry industry had very few friends, either in or out of government, did you resolve to do your best to bring about a better understanding of the importance of castings in our scheme of civilization? At that time, did you recognize the importance of winning friends for your own organization and the entire foundry industry; and did you promise yourself to do something about it?

Yes, you probably made such resolutions under the tension of emergency production. Now, the question of follow-through on these good resolutions naturally arises. Have you and your fellow foundrymen undertaken to tell the public about your organization, its product, and the basic character of castings? In other words, have you undertaken a program of public relations? To get the answer to this question, THE FOUNDRY has made a study of the foundry industry and its relationship to the community, and the findings are presented in this article.

Perhaps the first thing revealed by this study is a lack of agreement among foundrymen on the scope of public relations. To some, it embraces the entire sphere of relationships within and without the plant. To others it represents a narrower field of community

Fig. 1—Rockford (Ill.) Industrial Softball League 1948 champion was the Mattison Machine Works

Figs. 2-3—Open house for employees' families at the Hamilton Foundry & Machine Co., Hamilton, O.

Figs. 4-5—Students from Albion High School and surrounding communities visiting plant of the Albion Malleable Iron Co., Albion, Mich.

relations. Therefore, it seems best to define the territory to be covered.

John McGaffrey, president, International Harvester Co., has the following definition: "Public relations is living right and then telling people about it."

Charles N. Vance, assistant manager, industrial relations of that company, recently offered the following definition: "Public relations means conducting a business in such a way that one will think it is a good place to work, a good place to invest money, a good place to sell to and a good place to have as a neighbor in the community."

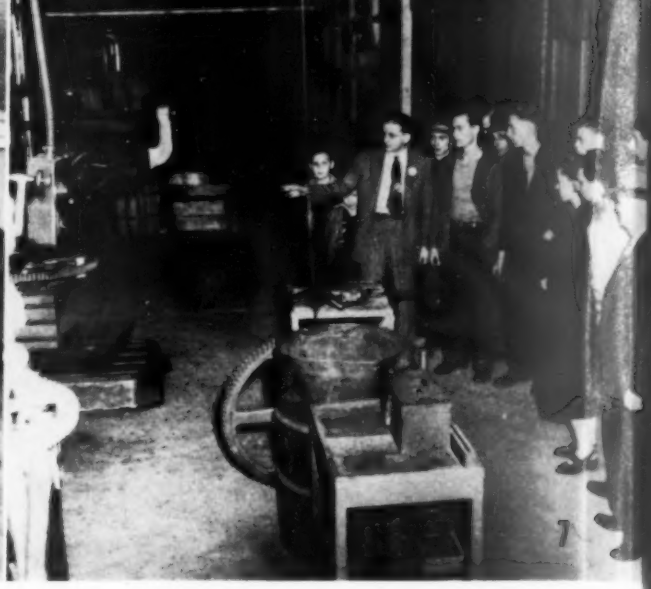
The definition which seems to apply best to the work of the foundry industry was presented recently by Elmer Walzer, financial editor, United Press Association, as follows: "Public relations for a corporation or other enterprise is its ability to live in a community as a good citizen, and to tell the people about it without bragging, and in such a way that the corporation or enterprise commands respect and is regarded as a desirable neighbor."

Basis of public relations in the foundry industry rests on the acceptance of the individual plant in its own community. If each producer of castings earns the reputation of being a good neighbor, the sum total of standings of all foundries will provide the general public with a real understanding of the industry. And this general public includes the workers in foundries as well as the buyers of castings.

In considering the relationship of the foundry with the community, the attitude of employees plays an important part. If workers are satisfied with their jobs, if working conditions are good, and if they have pride in the company and in its product, a great step has been made in establishing a good reputation of

HOW INDUSTRY REGARDS PUBLIC RELATIONS

Has top management adopted a definite public relations policy for your company?	34.5% Yes
Do you have an employee handling public relations?	40% Yes
Does this employee have management status?	91% Yes
How much time does he devote to this work?	17.3% Full time; 82.7% Part time
Has your company held an open house during the past year?	23% Yes
Does top management participate rather extensively in community affairs?	66.7% Yes
Do representatives of your company make talks to students at local schools, before P.T.A. groups and service organizations in which the functioning of your industry is explained?	28.5% Yes
Has your company prepared booklets and other printed information explaining your company, products, and its importance to the community?	14.4% Yes
Has top management of your company made friends with the local newspaper people?	74.5% Yes
Do you carry any display advertising in local papers?	21% Yes
Do you supply newspapers with news concerning the activities of your company?	52% Yes
Do you keep the local newspaper informed of company personnel changes?	41.8% Yes
Does personnel information given newspapers cover top management only?	20.2% Yes
Do you supply the newspaper with human interest stories on your employees?	15.8% Yes
Has top management made friends with the local radio station people?	38.5% Yes
Does company use radio for a sponsored program?	0.7% Yes; Spot announcements? 0.7% Yes
Do you give the radio news releases on company and personnel?	0.75% Yes
Do you provide prizes for community affairs?	46% Yes
Does your public relations man have a voice in deciding on requests for local contributions?	37.5% Yes
Do your employees have a glee club which appears at local affairs?	0.9% Yes
Does your company sponsor athletic teams that compete with other teams in the community?	56% Yes



What are foundries doing about

Public Relations

the organization among its neighors. But the work of bringing about such attitudes and satisfaction on the part of workers rests in the field of employee relations rather than public relations, and therefore will not be considered in detail in this discussion.

Likewise, promotion of company good will among the buyers of castings, which usually are situated considerably beyond the locality of the foundry, has been classified as sales promotion and will not be included in this study. However, certain co-operative efforts developed to further the acceptance of the foundry industry and its products will be considered later in the article.

This study on public relations in the foundry industry has been made possible through the kind co-operation of executives of 252 foundries scattered throughout the United States. Because these men took time to tell about the efforts of their organization, answered a rather large number of questions and in many instances sent along photographs, booklets and other materials bearing on the problem of establishing a friendly spirit in the community, THE FOUNDRY takes this opportunity to express its sincere appreciation to all who participated.

The 252 foundries co-operating in this study represent a return of 31.5 per cent on requests sent to a selected list of 800 foundries. Because it was believed that the members of one or more of the various trade associations ably serving the foundry field represent the most progressive elements among companies producing castings, the list of foundries to whom the questionnaire was sent was made up from the membership rosters of the Gray Iron Founders' Society, Malleable Founders' Society, Non-Ferrous Founders' Society and the Steel Founders' Society of America.

While a return of 31.5 per cent represents a highly satisfactory sample, it is probable that those answering the request for information include a better than average percentage of firms actively engaged in public relations work as compared with the companies which did not reply. Therefore, any attempt to extend the tabulated results to cover the entire industry would require considerable further study to determine the proper method of weighing results.

Answers to major questions answered by the 252 foundries are reproduced in an accompanying table. While no claim is made that these questions cover entirely the various activities which might be placed in the category of public relations, the fact remains that in all probability any foundry showing active work along the various lines questioned would be doing a much better than average job in selling itself to the community. For that reason, a detailed study of the returns should be of interest as an indication of what is being done.

Has top management adopted a definite public re-

Know Your Neighbors

and our co-workers

Working at the Waukesha Foundry co. seems to be a Golemgeske tradition. Fred Golemgeske was employed as a coremaker in the spring of 1921. Two years later he became a molder, his present job.

A son, Robert, a veteran, is a skimmer at the foundry, cousin Paul also is a molder and nephew Lester works in the experimental department.

Thirty years ago Fritz was married. He and Mina have four children.

His hobbies are fishing, including a little ice fishing, bowling and raising flowers. Born and raised in Waukesha, he owns a home at 336 Morey st.

FRED GOLEMGESKE

Waukesha Foundry co. and its co-workers whose products have helped make Waukesha world famous are proud of their 36 years as good neighbors in this community.

12

Waukesha Foundry Company

lations policy for your company? Of those replying to the questionnaire, 34.5 per cent indicated a definite policy has been established. Some questioned the word "definite" so that probably a larger percentage have some type of policy.

Do you have an employee handling public relations? Forty per cent answered "yes." Many others indicated that officers handled public relations as an added duty. Some

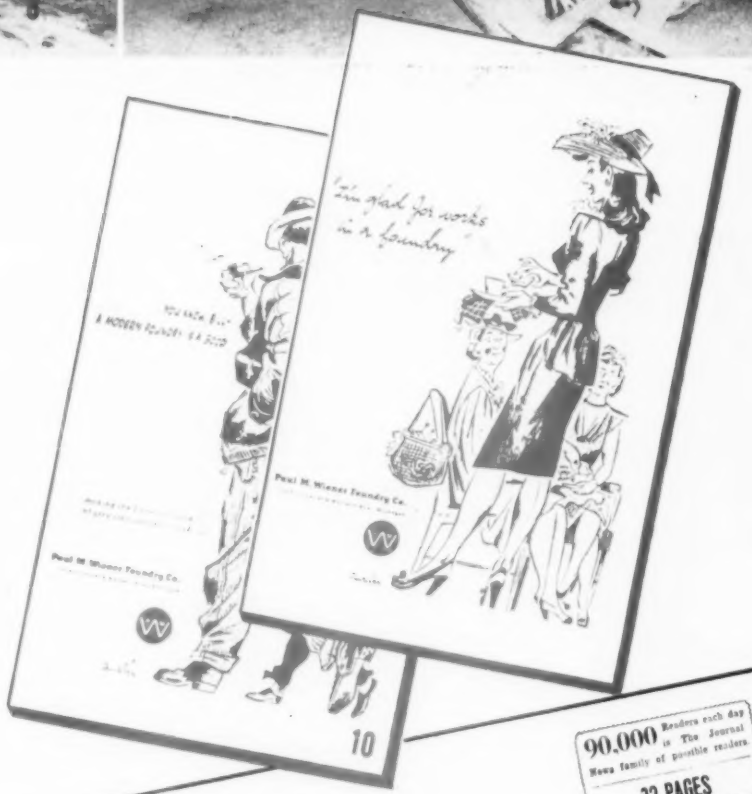
Fig. 6—Belle City Malleable Iron Co., Racine, Wis., provides booklets for open-house visitors
Fig. 7—Open house at New Holland Machine Co., New Holland, Pa.
Fig. 8—Students from Mississippi State College visiting American Cast Iron Pipe Co., Birmingham
Fig. 9—Softball team of National Supply Co., Torrance, Calif., 1949 champions
Figs. 10 to 12—Newspaper advertisements and articles help build public good will

90,000 Readers each day is The Journal News family of possible readers.
32 PAGES
WEATHER
HAMILTON AND VICINITY: OCCASIONAL RAINS TONIGHT AND THURSDAY; WARMER TONIGHT.
HAMILTON DAILY NEWS JOURNAL
FORT HAMILTON IN 1791
VOL. 82—NO. 307
PRICE FIVE CENTS
WEDNESDAY, DECEMBER 28, 1949
Buy and Hold Savings Bonds
Your Best Investment
Seventieth Anniversary Being Celebrated By Historic H. P. Deuscher Company; Hamilton Firm, Showing Marked Progress, Widely Known In World's Markets
The Deuscher Family Of E
Concern's Founding Told;
Years
Deuscher Company Officers
RACINE LABOR
11
AFL ★★★ THE UNION NEWSPAPER ★★★ CIO
Vol. 6—No. 37
PICTORIAL SUPPLEMENT
FRIDAY, DECEMBER 6, 1946
Belle City Foundry Holds Open House
Modern Methods of Making Castings Explained on Tour
The methods by which molten metal is shaped to form small intricate gears or huge blocks were shown to
5,000 people
Malleable

Fig. 13—High school boys visiting the National Supply Co. foundry, Torrance, Calif.

Fig. 14—Rotarians inspecting the sandslinger unit at International Harvester Co., Memphis, Tenn.

Fig. 15—When General Motors has an open house, interesting booklets are given to the kiddies and grownups

Fig. 16—International Harvester Co. entertaining visitors in the plant cafeteria at Memphis

Fig. 17 — Foundry displays at banks, libraries, association conventions and public expositions help spread the industry's story

What are Foundries doing about Public Relations?

of the companies who have been most successful in building respect for the organization in the community have had the public relations work headed by the president or vice president.

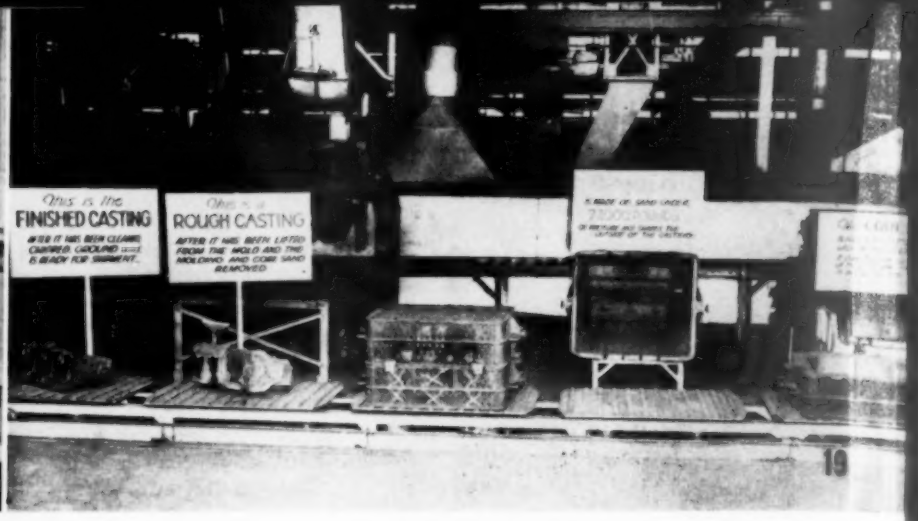
Does the employee handling public relations have management status? The fact that 91 per cent reported management status bears out the contention of many of the experts in the public relations field that any successful program must have the planning and the backing of top management. On the other hand, many of the replies indicated a lack of understanding of the problem or an unsympathetic attitude toward building a better understanding within the community. Top management here will need an educational program if the benefits to be obtained through public relations are to be realized by their own organizations.

How much time does the employee handling public relations devote to his work? It was rather surprising that 17.3 per cent of these employees devote full time to the problem. This includes foundries of medium size as well as the larger units. However, the greatest proportion of those engaged in public relations work handle the details in addition to their regular job as president, vice president, general manager, personnel relations manager, etc.

Has your company held an open house during the past year? Twenty-three per cent of those replying held an open house during the past year. However, a sizable number indicated that while such an affair has not been held during the past 12 months, that the open house has been a feature of their public relations program and will be continued in the future. Others stated that plans are going forward to hold an open house in the near future. Several reported that as soon as the modernization and mechanization program, now under way, is completed, management plans to hold an open house for the employees and families and in some cases for the community. A number of reports indicated that plant visitors were greatly surprised at the extent of the company's operations.

The number of tours scheduled by the individual plants varied considerably. Some companies have the policy of maintaining an open house at all times, so that customers and members of the community can be taken through the plant whenever convenient. Others have one or more specially arranged tours each year to which invitations are extended to specific groups in the community. The average number of tours of those reporting such affairs was 4.35.

To determine the types of plant visits being held, those receiving the questionnaire were asked to indicate the various groups invited. It is rather surprising to find that the greatest attention is being paid to junior and senior high school students. Replies show that 93 per cent of those holding an open



Figs. 18-19—Central Foundry Division of General Motors uses signs and personal discussions to explain the various steps in manufacture of castings

Fig. 20—Employees' families of Red Jacket Mfg. Co., Davenport, Iowa, learn more about the financial situation of the company

Fig. 21—Business, Industry and Education Day for Rockford and Winnebago county teachers brought the teaching personnel into the plant of Mattison Machine Works, Rockford, Ill.

Fig. 22—Typical examples of booklets prepared by foundries for presentation to plant visitors

house provide invitations to the younger generation. Service clubs rank second with 52 per cent and the remainder of groups invited in order of importance were as follows: Public school teachers; college students with emphasis on engineering classes; the entire community; employees and their families, engineering societies and PTA. Groups mentioned to a lesser degree include customers and vendors, local government officials, clergy, Chambers of Commerce, vocational school students, 4H Clubs, Boy and Girl Scouts, YMCA, Junior Chambers of Commerce, local charitable organization officials, cost accountants, women's

What are Foundries doing about

Public Relations

clubs and merchants and businessmen.

Comments of those who have staged an open house were highly favorable. In most cases arrangements were made to have special guides to accompany the visitors through the plant and to explain the various processes along the route. In small shops guides frequently were dispensed with, and the route was plainly marked. In this case, foremen were on hand at the different departments to answer questions. Quite frequently, when an invitation was extended to teachers or other who have to do with the molding of public opinion, special arrangements were made to provide luncheon or dinner. When the families of employees and the community were invited, some foundries provided snacks for the kiddies or even something for the grownups. The extent to which the company prepared for a plant visit centered largely upon the enthusiasm and ingenuity of the individual or group in charge of such arrangements. One company was so successful in staging the plant visit that the local union newspaper published a special edition describing and praising the plant visitation.

Another company combined with the unions to entertain 700 4H Club members at breakfast at the time of the annual 4H Club fair. The company provided the food and the workers served it. The community in which the plant is located is small and the 4H Club members came from all over the surrounding countryside, thus carrying the story of the plant and its product to many young boys who may be interested in a job in industry after finishing school.

The open house for engineering classes generally is designed to give the students a clear idea of foundry operations and the value of castings in engineering construction. Such visits are prevalent among progressive foundries located near engineering schools.

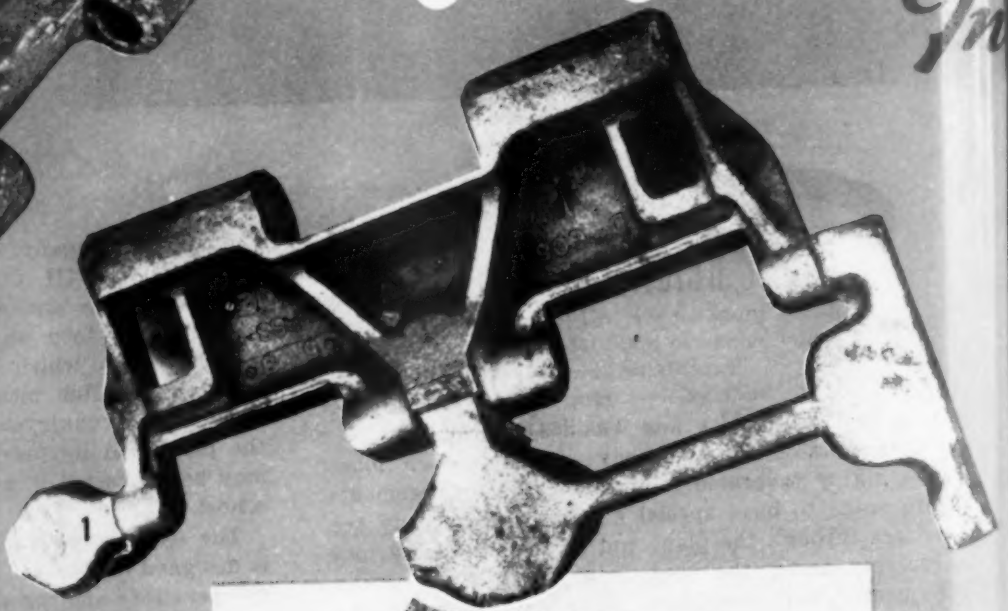
The open house undoubtedly is an important tool to the organization practicing good public relations. Its value has been proved time and again by many foundries. A leading foundry manager has said on several occasions that getting the plant cleaned up is one of the most important products of the open house. But the direct benefits in good will pay dividends in the long run. Foundries that have staged an open house for the families of the employees find that a visit to the plant in operation produces a feeling of pride in the work that the employee is doing. It dissipates the idea that the plant is not a good place in which to work, and, when properly staged, can draw attention to the essential character of the castings being produced. Of course, proper staging is the all important item. Comments indicated that many organizations spend considerable time in planning an open house and in seeing that the affair runs smoothly.

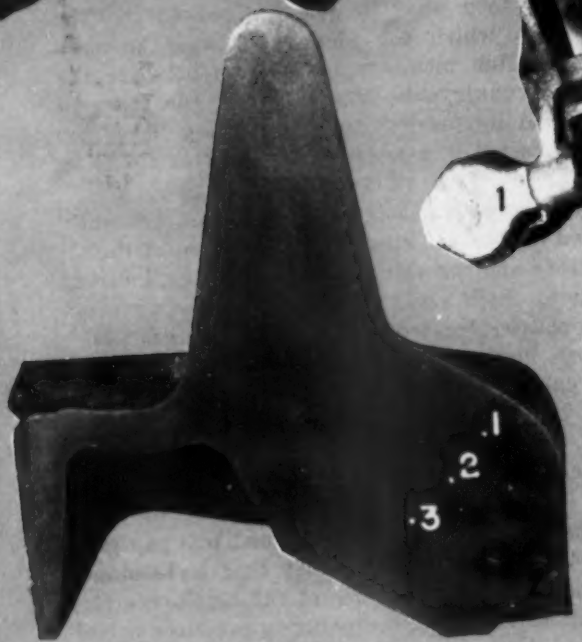
Does top management participate rather extensively in community affairs? While 66.7 per cent of those replying indicated that they are active in the affairs of the community, this total is somewhat disappointing when the importance of the activity is considered. Participation ranged all the way from memberships on civic committees to political offices including the school board and city council. Management also is serving on boards of the Community Chest, Red Cross, Boy Scouts, service clubs, Chambers of Commerce and other organizations.

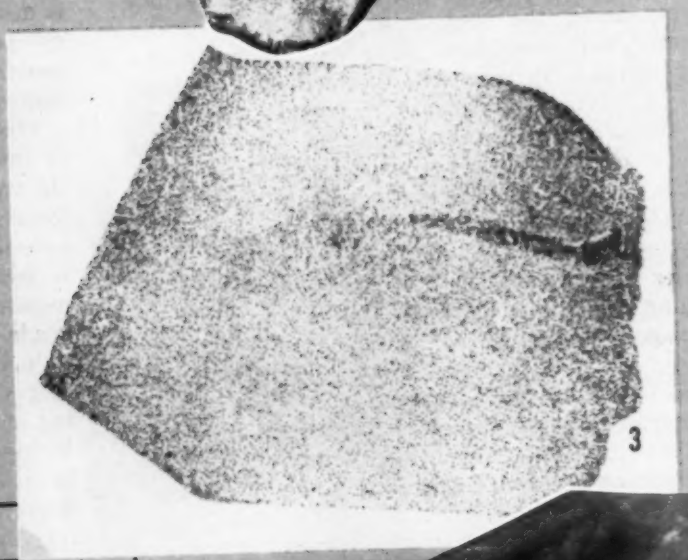
Do representatives of (*Please turn to page* 144)

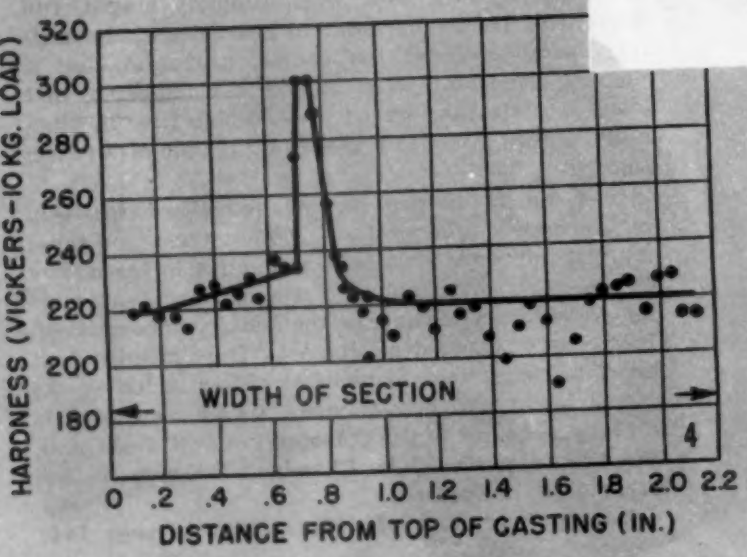
Segregation

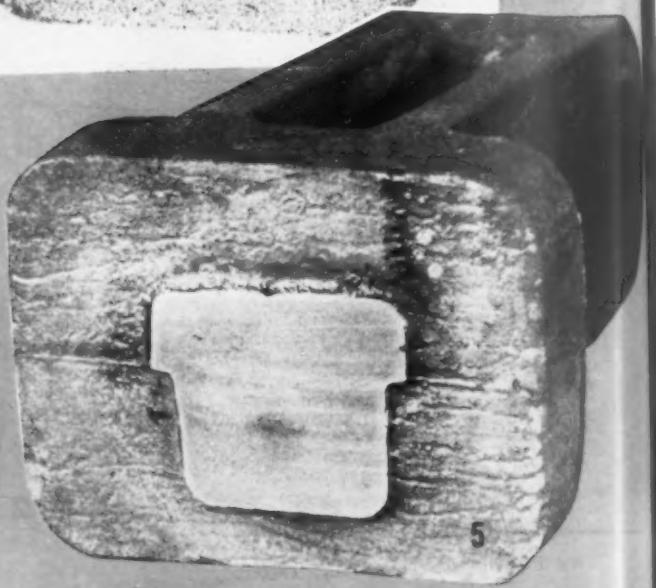
In Sm











By HAROLD F. BISHOP
Naval Research Laboratory
Washington

Small Steel Castings

Abstract

Pronounced segregation of carbon, and to a minor degree the other alloying elements, has been found in small steel castings adjacent to the riser contacts. This segregation, indicative of potential shrinkage, occurs when restricted riser contacts are used. Examples are shown in which the carbon content is nearly twice that of the base metal.

It is concluded that in castings where such segregation occurs, the riser contact consists of solid low-carbon dendrites surrounded by liquid high-carbon metal during the latter stages of solidification. To supply the last feed metal required by the casting, the interdendritic material is drawn into the casting to form the segregated zone.

Intensity of carbon segregation under "neck-down" risers varies directly as the neck length and inversely as the neck diameter. Amount of carbon segregation also increases as the section thickness of the casting increases. Segregation can be reduced by using exothermic core materials to form the riser necks.

A centerline segregation is found in long slender cast sections which extend for a comparatively great distance from the riser. This segregation depends on the elongated shape of the casting and is not influenced by type of riser contacts used; it appears to result from the drainage of high-carbon interdendritic liquid from the areas adjacent to them.

SEGREGATION in cast steel is usually associated with massive sections such as found in large ingots. It has been found, however, that severe segregation of carbon, and to a lesser extent of the other alloying elements, can, under certain conditions, occur in castings weighing but a few pounds. This type of segregation arises from different conditions than the segregation in ingots.

Such segregation in steel castings can be the cause of hard spots encountered in machining operations; it can be the cause of localized quench cracks or weld cracks, and it can be the cause of cracking during flame cutting operations in carbon and low alloy steels which normally would not crack.

The castings described in this report were poured into air-dried molds. A high-frequency induction furnace was used for melting, and the charges consisted of foundry returns. Additions of ferrosilicon and ferromanganese were made to the furnace and, when necessary, high-carbon pig iron was also added to raise the carbon content of the heat. Final deoxidation was accomplished by adding 0.10 per cent of aluminum to the ladle. The castings were poured at temperatures within the range of 2900°F to 3000°F.

Segregation in Tank Tread Castings—During the war a company engaged in the manufacture of tank treads reported that hard spots were discovered during machining operations and that cracks occurred where the risers had been burned from the casting. Several of these castings were sent to the Naval Research Laboratory for inspection. It was found that these treads, which were made of a steel containing 0.35 per cent carbon, 1.50 per cent manganese, and 0.35 per cent molybdenum, had highly segregated

Fig. 1—Two views of tank tread casting with blind risers attached
Fig. 2—Showing segregation in section through center of tank tread casting
Fig. 3—Sulphur print of segregated zone in tank tread casting
Fig. 4—Hardness survey across segregated zone in tank tread casting
Fig. 5—Riser contacts of bracket castings etched to show areas of carbon segregation
Fig. 6—Bracket castings and risers

areas in the sections adjacent to the risers. Top and bottom views of one of the castings with the risers attached are shown in Fig. 1.

These castings were fed by blind risers containing the Williams sand core, which permitted access of atmospheric pressure to the riser. The lugs to which the risers were attached were cast solid, while holes were cored in the lugs on the opposite side of the casting. Since hard spots were most frequently encountered in machining the hole through the solid lug, a thin section through this area was removed for examination. This section was found to be radiographically sound. When this specimen was etched with ammonium persulphate a thin segregated zone was found leading from the riser contact and extending across the lug as shown in Fig. 2. From a hardness survey made across the segregated zone with a Vickers hardness tester, it was observed that the base metal in the as-cast condition had a hardness of 220 Vickers and the segregated zone had a maximum hardness of 300 Vickers. The hardness curve across the segregated area is shown in Fig. 4.

In determining the variation in carbon content between the segregated area and the base metal, a specimen having a thickness of 3/16-in. was water-quenched from 1650°F and surveyed for hardness. Since the maximum quench-hardness that can be obtained in steel depends only upon the carbon content, it was possible to derive the carbon content of the specimen by referring to the curves of Clark and Kowal,[1] which show carbon content plotted against quench-hardness. It was found that the carbon content of the segregated zone was 0.57 per cent while the carbon content of the metal adjacent to this zone was 0.37 per cent. Drillings taken from the casting some distance from the segregated zone contained 0.33 per cent carbon. The segregated zone thus contained

Fig. 7—Segregation (dark areas) beneath knock-off risers in two castings
Fig. 8—Segregation in bracket casting shown on right of Fig. 5 a half-inch from surface of flange
Fig. 9—Carbon content at various locations in cylinder casting and its knock-off riser
Fig. 10—Carbon contents in casting made with a conventional riser
Fig. 11—Hardness survey across segregated zone of casting with 2-in. neck shown in Fig. 7

at least 0.20 per cent more carbon than did the remainder of the casting.

From a spectrographic analysis made at the positions indicated on Fig. 2, it was determined that there was a segregation of other alloying elements as well as carbon. The results of this analysis are as follows:

	Position 1	Position 2 (Segregate)	Position 3
Manganese	1.55 %	1.83 %	1.40 %
Molybdenum	0.32 %	0.43 %	0.30 %
Chromium	0.081%	0.097%	0.077%
Nickel	0.08 %	0.09 %	0.08 %
Silicon	0.70 %	0.81 %	0.70 %

The segregation of sulphur in this section is shown by the sulphur print of Fig. 3.

Since the hole which must be machined in the mating lug passes through the segregated zone, it is not surprising that hard spots were encountered in machining, and since the segregated zone extends to the riser connection, the occurrence of cracking in burning the riser from the casting might also be expected.

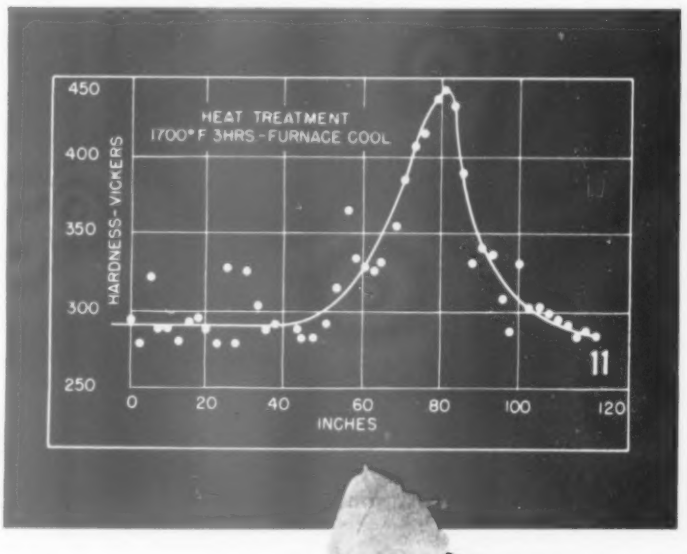
Segregation in Bracket Castings—Another example of segregation of this type was found in small bracket castings which were risered as shown in Fig. 6. Two sizes of riser contacts were used on the castings illustrated. The riser contacts were etched with a 10 per cent ammonium persulphate solution which disclosed the areas high in carbon content seen in Fig. 5. Both of the castings were sound, but it is apparent that with the larger contact the degree of segregation is reduced. Fig. 8 is a photograph of an etched section obtained ½-in. behind the surface of the flange-face of the casting shown on the left of Fig. 6. It can be seen that the segregate is still present at this point. Spectrographic analyses of the top segregated area of Fig. 8 and the base metal indicates slight segregation of alloy elements.

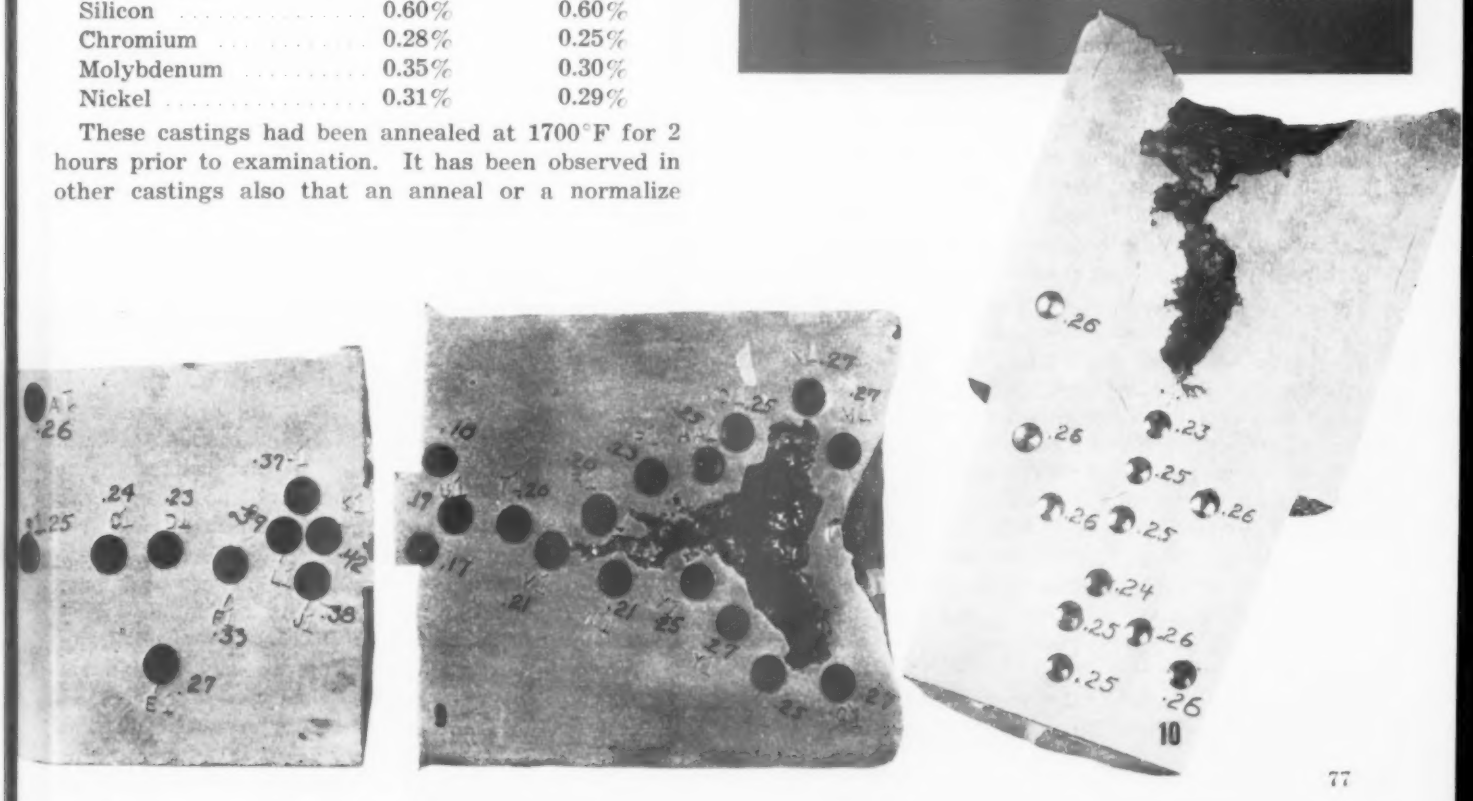
	Segregate	Base Metal
Manganese	0.75%	0.70%
Silicon	0.60%	0.60%
Chromium	0.28%	0.25%
Molybdenum	0.35%	0.30%
Nickel	0.31%	0.29%

These castings had been annealed at 1700°F for 2 hours prior to examination. It has been observed in other castings also that an anneal or a normalize and temper treatment has little if any tendency to disperse the segregated elements.

From the preceding illustrations it is shown that segregation occurs near riser contacts which have a cross-sectional area smaller than that of the riser, and that the magnitude of segregation is increased as the riser connection is reduced.

Segregation Beneath Knock-off Risers—Since small riser contacts are conducive to the formation of segregation, knock-off or Washburn riser necks were expected to increase the severity of the condition and were therefore studied in experimental castings. Fig. 7 shows an etched section of two cylindrical castings 4 in. in diameter and 6 in. high and the Washburn risers which fed them. The riser necks on the castings were 1½ and 2 in. in diameter and were formed by cores having a thickness of ½-in. The top ½-in. of each casting was removed for analyses and hardness surveys, and these segments are not shown in the illustration. A slight shrinkage cavity was found in the casting to which the (*Please turn to page* 139)





By GEORGE B. COMFORT
Schramm Inc.
West Chester, Pa.

Maintenance of Air compressors

How to obtain maximum efficiency from the foundry air compressor is discussed in this paper presented by the author before the Philadelphia Chapter of the American Foundrymen's Society

MAINTENANCE of any piece of machinery in the foundry is largely a matter of lubrication and the prevention of dust from entering the bearings and working parts.

This is particularly true of the air compressor, because it inhales so much air, and all dust in that air is also inhaled. Foundry dust and sand, mixed with lubricating oil, makes a fine abrasive.

Let us differentiate, first, between air compressors and blowers. In general, let us call the type of machine that delivers air at less than 30 pounds gage pressure, a blower, and the machine that delivers air at higher pressures, an air compressor.

In the foundry the blower generally is used to furnish air for the cupola and the compressor furnishes the air for molding machines, vibrators, hoists, sand blast, chipping hammers, grinders, core breakers and a host of other tools.

The size of an air compressor is stated either in piston displacement, expressed in cubic feet per minute; or in actual free air delivered, expressed in cubic feet of free air delivered per minute; or in the horse-power of the driving motor. Actual air delivery is the only really worthwhile figure, because one can use only the air that is compressed and delivered by the compressor.

It is important to introduce as clean air into the compressor as possible. If a 105 cubic foot compressor, or one driven by a 25-hp motor, takes in all of the air from 105 cubic feet of space it also takes in all of the dust that is in suspension in that space, every minute, and when this amount of dust is multiplied by 60 minutes and by 8 hours, the total can be enormous.

Every compressor intake must, therefore, be protected by a good air filter. There are many types, but all of them require cleaning, and the frequency of cleaning depends entirely on the amount of dust in the air. When the filter is dirty, it must be cleaned, whether this is once a day or once a week.

Often it is advisable to pipe the air from a cleaner place than where the compressor is located. This can be done with ordinary pipe, but care must be taken that there is no restriction in the pipe line. Care should also be exercised that the air outside the room is cleaner and freer from steam than the air in the room where the compressor is located.

If, in order to protect the compressor from dust, it

Standards Must Be Ob

TOO many iron foundries ignore the f[ull] importance of cupola operations in the ov[er]all picture of their business. The melt[ing] department, like the sand department, is of[ten] considered a necessary, but costly, nonprod[uc]tive unit which services the producing unit. In other words, the cost of melting is often c[on]sidered as overhead, and it is felt therefore that it must be kept at a minimum even though quality control suffers.

Some foundries which neglect to develop and follow thorough standards and specifications on cupola operations apparently feel that they are saving money, but actually they are being "penny wise and pound foolish." And it also should be recognized that standards must be followed religiously day in and day out, rather than not at all or only when an emergency exists.

Personal observations and experiences with cupola operations in various foundries serve as the basis for this article. Many of the recommendations given will appear to be too basic and fundamental, but they are emphasized here because of the amazing fact that foundry personnel forgets or ignores them, even though they are assumed to be common knowledge and practice.

The following rather complete and thorough investigation of cupola operations was inaugurated when a large cupola (lined to 78 in. diameter) was habitually burning out excessively in certain areas. It was decided that all information pertaining to any phase of the operation be obtained for every heat of iron in order to discover the cause or causes of the excessive burn-out. Items checked during the investigation were as follows:

1. Extent and location of burn-out after each heat.

2. Extent of tuyere erosion after each heat. Cast iron divided tuyeres were used.

Observed in Cupola Operations

By R. H. OLMSTED
Whitehead Brothers Co.
New York

3. Measurement of blast distribution uniformity by means of an anemometer.

4. Number, type and condition of slag hole blocks used. Back slag holes were used on this cupola.

5. Complete tap hole information and data.

6. Type and condition of each patch.

7. Complete survey of patching material. This included such items as the weights of ingredients, mulling cycle, and moisture.

8. Complete record on linings. This included the frequency and the extent of relinings, as well as the materials used.

9. Tuyere replacement information.

10. Survey of all cupola measurements as compared with standards and blueprints.

11. Weights and distribution of limestone in charges.

12. Weights, size, and distribution of coke in charges.

13. Weight, size and distribution of metal in charges.

14. Height and weight of bed coke for each heat.

15. Condition of wind-box and tuyeres.

16. Size of each heat.

17. Check on any conditions such as partially blocked tuyeres which were necessary in order to obtain uniform blast distribution.

18. Comparison of cupola blocks with other materials used in linings.

In the preliminary (*Please turn to page* 200)

is placed in an enclosed room, don't forget that the compressor takes in large quantities of air and provision must be made for the admission of this amount of air.

All atmospheric air contains some moisture and the amount of moisture that can be carried increases rapidly as the temperature of the air increases. Completely saturated air is said to have humidity 100 per cent and a lesser amount of moisture is said to be a percentage of that amount. Completely saturated air at 90° F contains about seven times as much moisture as completely saturated air at 0° F.

As an example, on a summer day when the temperature is 90° and the humidity 80 per cent, a 25-hp compressor delivering about 105 cubic feet of air per minute will put more than a gallon of water in the air lines every hour, and that is wet air.

There is only one practical way to eliminate this water. The compressed air from the compressor is hot air—so hot, in fact, that the large amount of moisture in the air will be in the form of invisible vapor. But as this air stands in the receiver and passes through the air lines its heat is lost by radiation, and the compressed (*Please turn to page* 190)

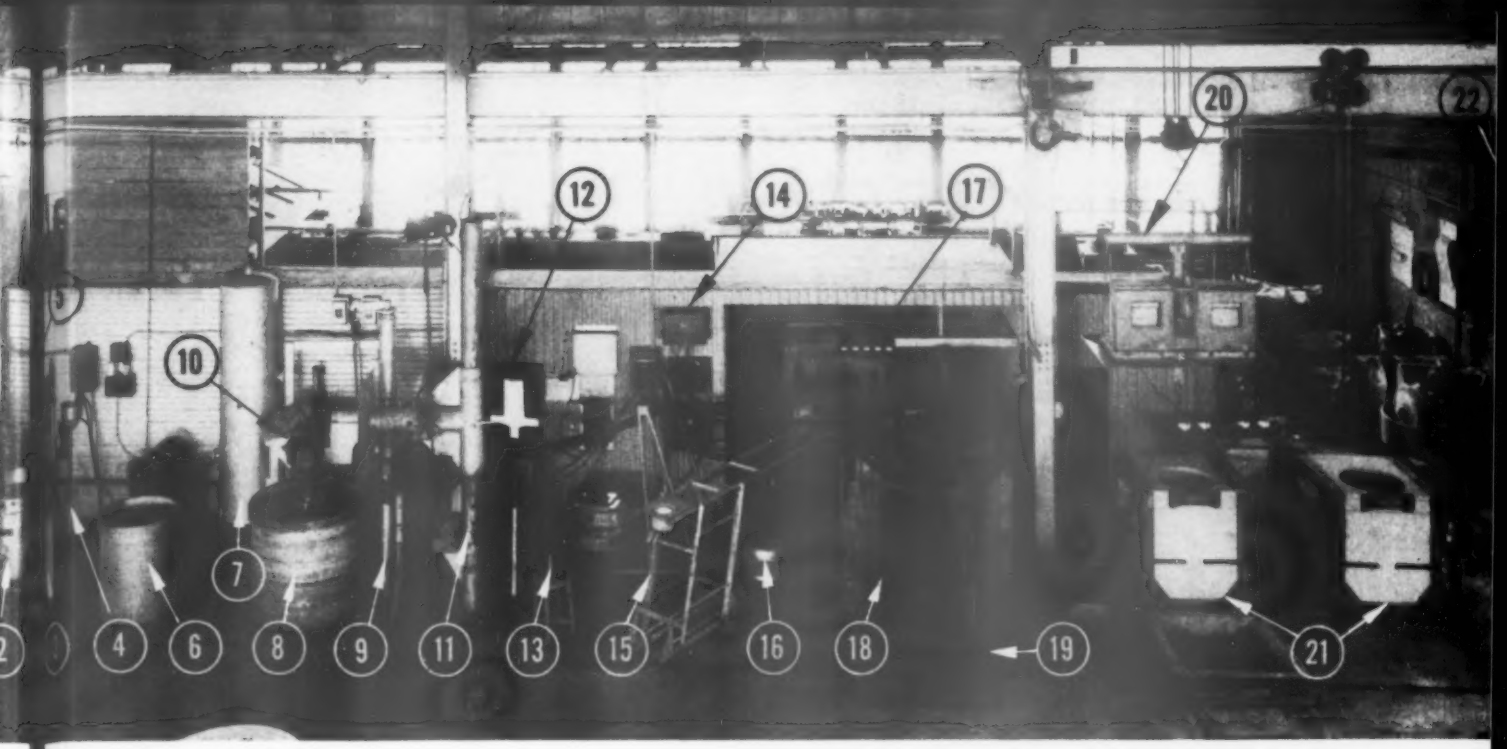
U.S. NAVY Casting Research

★ *New and improved casting processes and equipment have resulted from an intensive research program conducted for the Navy at the Alloy Engineering & Casting Co., Champaign, Ill. This is the first of two articles describing work on the experimental production of bladed and shrouded steam turbine wheels cast integrally and jet engine rotors cast with and without inserted blades*

By H. H. HARRIS
Project Director
U. S. Navy Research & Development Project
and ERLE F. ROSS
Chicago Editor
THE FOUNDRY

THROUGHOUT U. S. Naval history the Navy has been one of the largest users of castings purchased from industrial foundries. Navy technical specifications have been directed at improved metallurgy, physical properties, soundness and, above all, dependability and functional utility, ranging from pumps and propellers through turbine housings and gearing, from motor frames to periscope parts, and from porthole frames to deck hardware. The Bureau of Ships uses an infinite variety of castings, some 90 per cent of which are purchased by Navy suppliers of ship components. It has special requirements for new developments in gas turbines and heat-resisting alloys, as well as extensive applications for corrosion-resistant alloys.

The Bureau of Aeronautics in aircraft engines, su-



per chargers, and particularly in the new jet and gas turbine engines, has been confronted with geometrically expanding demands and requirements for new and better alloys. As technical frontiers are crossed in quest of heat-resisting alloys and super high-strength materials to meet heretofore unknown requirements, castings are playing a more important role than ever before. On technical and metallurgical advances, making possible increased power, speeds, and dependability in aircraft, much of the striking power of the Navy and national security may well depend.

Bureau of Ships and the Bureau of Aeronautics have long been cognizant of variables affecting castings and have concluded that the reduction of these variables must be brought about through new and improved processes and controls requiring other than conventional approaches and through special facilities and equipment directed by personnel having the breadth of experience encompassing the design, metallurgy, use and cause of failure of castings, as well as the foundry arts and advances in fact and theory.

In keeping with this objective, the Navy entered into a contract with Alloy Engineering & Casting Co., Champaign, Ill., to conduct intensive research on castings and casting techniques. Work on the contract began in June, 1947, and was scheduled to terminate formally Oct. 31, 1949. For several years preceding this contract, the company had been carrying on extensive research and development, including much practical application of some phases of this type of work. This contract has been directed by H. H. Harris, president, General Alloys Co., Boston, which company has participated in several phases of the development and has loaned personnel both with and without compensation on the project. It has also done considerable related work without cost to the Navy. On many inventions and developments patents are pending or will be applied for. On patents obtained as a result of work preceding the contract, the Armed Forces will be licensed. On those covering developments on the contract, the Armed Forces will be fully licensed and the commercial rights for nondefense industrial application will remain with the inventors and their assigns.

Fig. 1—General view of advanced casting facilities which include three centrifugal casting machines. Key to equipment is explained in text

Fig. 2—Group, watching plastic bonded ceramic faced cores going through dielectric heating machine, includes, left to right: Comdr. R. H. Lambert, chief, Casting and Forge Section, Bureau of Ships; H. H. Harris, president, General Alloys Co., and project director; N. E. Promisel, head, Materials Section, Bureau of Aeronautics; Comdr. R. T. Simpson, chief, Turbine Gear Section, Bureau of Ships, and Robert Martin, physicist-operator

Fig. 3—Conveyorized dielectric machine for drying cores and molds and firing ceramics. Capacity is 1500 pounds of cores per hour

While this project is technically and specifically for the experimental production of bladed and shrouded steam turbine wheels cast integrally and for jet engine rotors cast with and without inserted blades, the work conducted covers broadly research and development work in practically all foundry controls and processes, and relates to as-cast castings in general. Special facilities and equipment have been developed that go far beyond the laboratory stage so that the problem could be studied and the solutions approached on a scale applicable not only to production of specific objects of the contract, but to permit application to Navy and industrial use on a production scale with minimum effort.

In the methods heretofore employed to produce rotors and wheels the blades are forged and machined or cast by one of several established precision investment molding methods and are costly. In the case of gas-turbine type rotors, (*Please turn to page* 166)

Modern Practice in Investment Casting

Properties of pattern and investment materials are discussed in this first of three articles comprising a thorough analysis of the various factors entering into production of investment castings

THIS process is usually called "precision casting," but the author believes that title to be misleading and prefers to call the process "investment casting." The word "precision" implies very close tolerances such as can be given by machining. Casting accuracy does not attain that degree of precision.

Investment casting has been well defined in the following works: "An investment casting should be defined as a metal casting process employing an expendable pattern in conjunction with an unparted or one-piece mold. The mold is made of ceramic material which completely covers the pattern and has no line of separation; i.e., no cope and drag."[1]

This process is not new. The lost-wax process was employed by the Chinese over 2000 years ago. In the 16th century Cellini used investment casting to produce statuary. In 1907 Dr. Taggert, an American dentist, used wax patterns surrounded by investment to make dentures. Other dentists quickly followed suit. In 1935 jewelers became interested in the process for casting precious metal rings. Their purpose in making such castings was not precision in regards to measurements, but rather the accuracy desired was that of fidelity of reproduction.

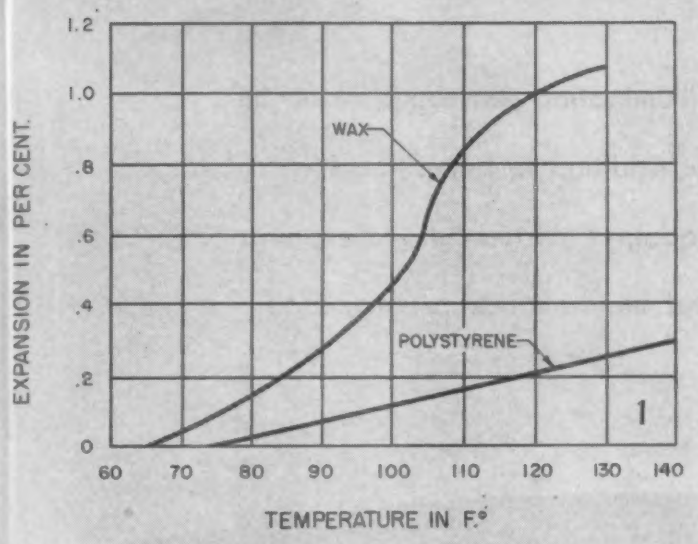
World War II, with its demand for many small parts requiring dimensional accuracy and smooth finish—such as parachute harness releases, small turbine blades and buckets, radar parts, etc.—really gave investment casting its greatest impetus. After the war demand in general for investment castings decreased with the disappearance of military orders, although numerous new commercial applications were developed.

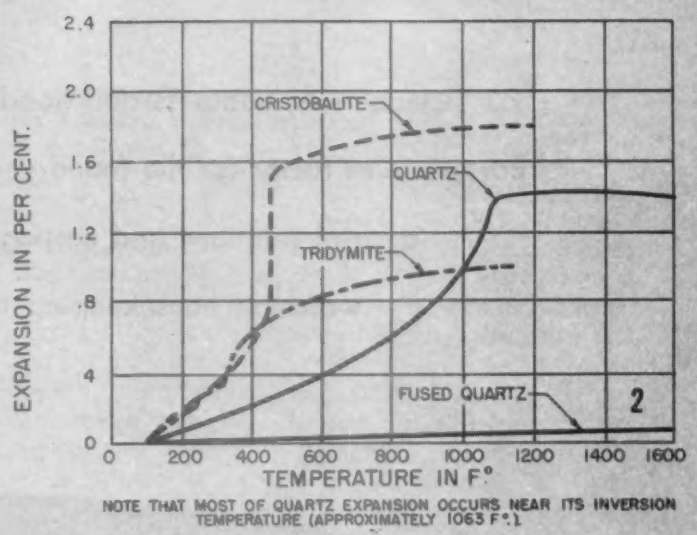
Part of the postwar difficulties encountered by the investment casters was due to the fact that the process mushroomed rapidly from a dental and jewelry business to a large-scale commercial process. The commercial parts were larger, more intricate, and more demanding in dimensions. The industry had not had sufficient time for pilot or experimental work to determine the fundamentals necessary for large-scale operation. Some parts were very good in every respect, but performance in some cases was erratic and rejections were high. Troubles were fought by methods not always based on fundamental knowledge of the process. When price again became a factor, the high rejection rates made costs excessive, and, due to lack of pilot or research work, many companies were unable to continue.

The result of these setbacks was to cause the industry to take a good look at itself and try to move ahead once again. One of the results of this self-analysis has been that practical tolerances have been changed. This is best expressed by the statement of one of the leaders in the field as given in the following paragraph.

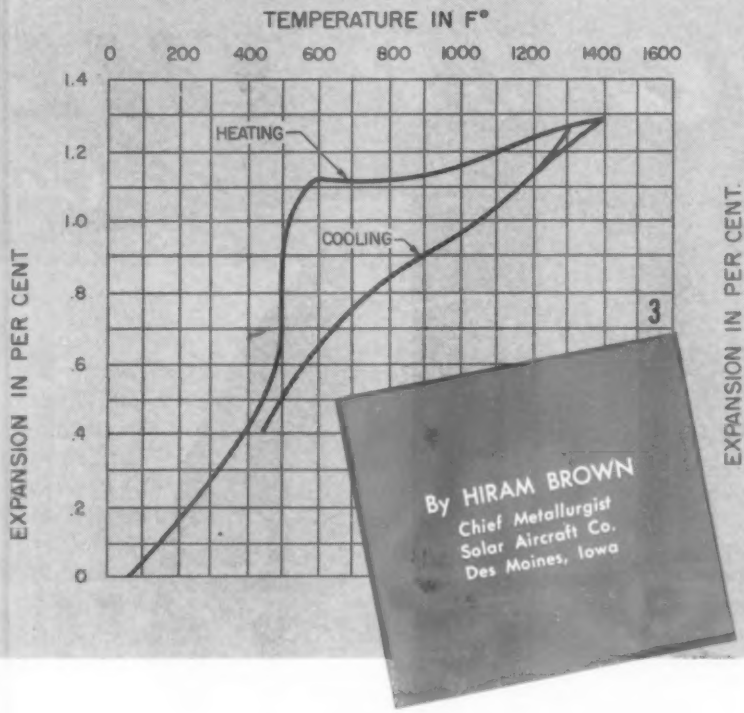
"Tolerance of .002 to .003 inch can be produced in small parts under closely controlled laboratory conditions. However, it now appears that commercial tolerance of $\pm$ .005 inch per inch with a minimum of $\pm$ .003 inch can be maintained on the majority of parts supplied in production quantities. When closer tolerances are required, a finish operation is generally necessary. Perhaps the fullest advantage of 'precision' casting is gained by casting profiles to size and finishing bearing surfaces or other close tolerance surfaces by grinding or machining."[2]

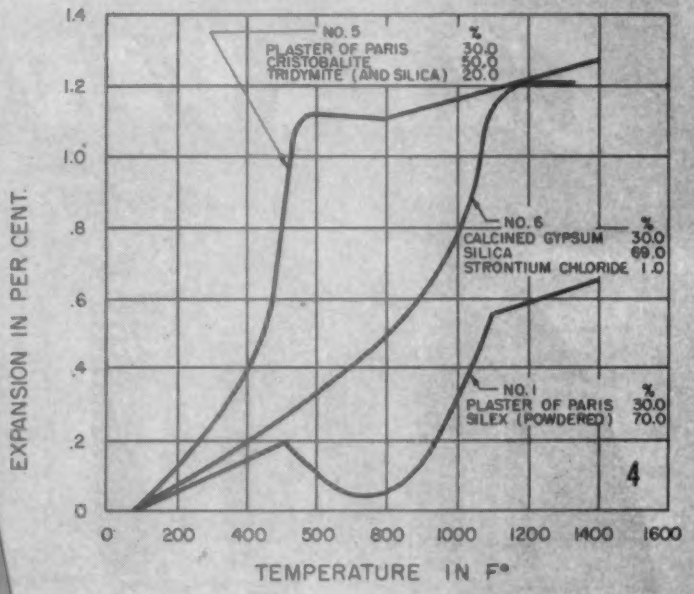
Despite all of the work that has been done the industry's chief advantage lies in the casting of small





NOTE THAT MOST OF QUARTZ EXPANSION OCCURS NEAR ITS INVERSION TEMPERATURE (APPROXIMATELY 1063 F.°)





By HIRAM BROWN
Chief Metallurgist
Solar Aircraft Co.
Des Moines, Iowa

parts whose extremely intricate shape makes it almost impossible to manufacture reasonably by any other method, and in casting alloys which are very difficult to machine or form in any other manner.

The practices for investment casting do not closely resemble those of any other casting process. It is similar to permanent molding in two respects: (1) The greatest dimension of investment castings is usually in the vertical position in the mold instead of horizontal as in the case of sand castings, and (2) the permeability of the mold is low and venting is a problem. It differs from permanent molding and die casting in the rate of cooling in the mold. It differs from permanent mold, die and sand casting in that the casting cavities are almost completely hidden and the mold cannot be parted to examine it before pouring.

In general, the investment casting process is a complex one that can be carried out only by thorough and continuous research into background principles and a careful check on (*Please turn to page* 205)

Fig. 1—Expansion curves of a pattern wax and plastic

Fig. 2[9]—Thermal expansion of four forms of silica

Fig. 3—Heat and cooling curves of cristobalite investment for nonferrous metals

Fig. 4—Thermal expansion curves of typical investments

Cleanliness, neatness and good illumination can comprise an important sales factor for the foundry—in addition to benefiting industrial relations and casting quality. Listed here are points to watch in housekeeping and maintenance programs

CLEANING UP THE F

Can Pa

Fig. 1—Aluminum paint on structural and machine parts increases visibility in the foundry

By BENJAMIN MELNITSKY

Fig. 2—Good housekeeping is aided by pallet loading and stacking of metal pigs and ingots

FOUNDRY n Pay Dividends

● BENEFITS derived from cleanliness and orderliness in any manufacturing plant should be self-evident. But the fact that many such benefits are intangible ones—not easily measured in actual dollar savings—frequently contributes to neglect of good housekeeping and maintenance programs. Consequently, it is well for the average foundry to review periodically the effectiveness of its programs to determine whether all of the possible benefits to be derived from them are being achieved.

From the standpoints of the employee and the quality of his product the benefits accruing from the clean, neat and well lighted foundry are: (1) improved employee morale as a result of the more pleasant work environment, (2) increased production through both better worker attitude and the improved work facilities, (3) fewer accidents because floors are cleared of obstructions, lighting is better, machines are in good repair, etc., (4) decreased absenteeism resulting, for example, from less eye strain and fewer accidents. Equally as significant in the matter of absenteeism is the psychological desire to escape from the unpleasantness of a run-down plant. Consciously or subconsciously, workers tend to stay away from the job when work conditions are poor, (5) fewer instances of faulty workmanship resulting from poor working conditions.

Another dividend accruing from efficient housekeeping and maintenance results from the fact that the physical appearance of the shop is an important sales factor—something not to be overlooked with the reappearance of a buyers' market. The orderly, well maintained foundry creates a favorable impression on visiting customers. Call it "window dressing," if you will, but the casting buyer cannot help but be impressed, just as the retail shopper is attracted by the handsome store front and window displays.

Needless to say, good housekeeping and maintenance —no matter how effective—will not necessarily give rise to a metallurgical Elysian field where contentment reigns supreme among workers and orders from customers pour in. Cleaning up the foundry has significance only when applied in conjunction with other efforts to improve operations and to attract customers, but it will give more than ample return for the time and money invested in it.

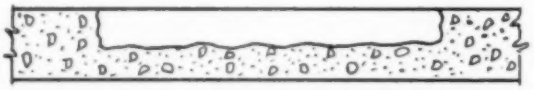
A satisfactory program to develop the sort of plant conditions desired requires participation by all departments of the company, because it affects not only the shop but the front office, the sales force and the public relations policies. The completed program should be then translated into definite rules and standards. For instance, merely to state that the plant should be painted, is vague; to specify that Shop No. 1 is to be painted such and such a color scheme at a specified time by a specified person, is definite. Similarly, floors and walls should not only be cleaned but cleaned on specified days and in a standard manner.

Equally important to the success of the program is the follow-up. Checking the progress of housekeeping, sanitation, and other measures is far too often overlooked entirely or performed in a desultory manner. Once formulated, the program should be publicized throughout the plant by means of bulletin board notices, posters, plant publications, and other available media. Each foundry, according to its size and facilities, should see to it that workers are made aware of plans afoot and are shown—in black and white—the roles they are expected to play.

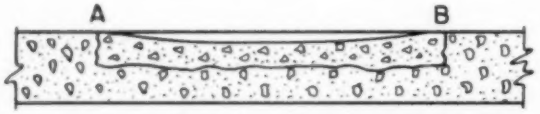
The nature and objectives of such programs will vary among different foundries; hence, specific regulations are not universally applicable. There are, however, certain common denominators pertinent to all concerns. These are discussed in the paragraphs that follow.

"Dingy," "dark," "dismal" are anathema of good window dressing, be it for a Fifth Avenue department store or a gray iron foundry. Inadequate, or what is equally as bad, improper lighting makes for inefficient work and presents a poor appearance. Although figures have been published purporting to show statistically the relationship between work output and adequacy of illumination, their validity is open to question because so many factors other than illumination influence quality and quantity of work output. However, it is self-evident—even without supporting facts and figures—that improved vision, the result of sensible and scientific lighting, relieves eye strain, increases visibility, results in better work, fewer accidents, and improved worker attitude. Even more obvious is the aesthetic value of proper lighting. Light, in and by itself, is a proven selling factor, be it for cafeterias where bright lights attract cus-

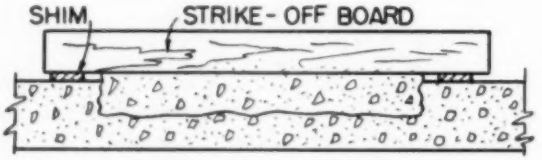
INCORRECTLY INSTALLED PATCH—Patches installed with feathered edges will soon break down under trucking.



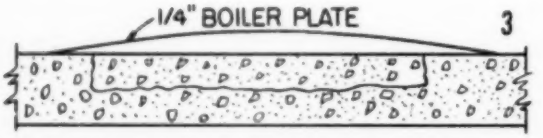
CORRECTLY INSTALLED FLOOR PATCH—The chipped-out area should be at least 1 in. in depth with the edges perpendicular.



RESULTS OF INCORRECT SCREEDING OF PATCH—When a patch is originally struck off to the level of the floor, the concrete will sag in the center, due to the fact that the straightedge has a tendency to cut off slightly below its lower edge and to the fact that the concrete shrinks during hardening. Additional concrete placed in the concave area will soon chip out under traffic.



CORRECT METHOD OF SCREEDING PATCH—The strike-off board is held slightly above the level of the floor by strips or shims laid the length of the patch on two sides. For large patches the thickness of these strips will be greater than for small patches. The concrete is allowed to rest for 1 to 2 hours. This allows the concrete to attain some of its initial shrinkage before being troweled to its final plane and will result in a uniformly level surface, plane with the rest of the floor.



PROTECTION OF PATCHES—Patches should be kept continuously wet and protected from traffic during the curing period. An economical method of protection consists in using a piece of ¼-in. steel sheeting bent as shown and placed over the patch to take traffic during the curing and hardening period.

tomers from the street or for foundries through which visitors may stroll.

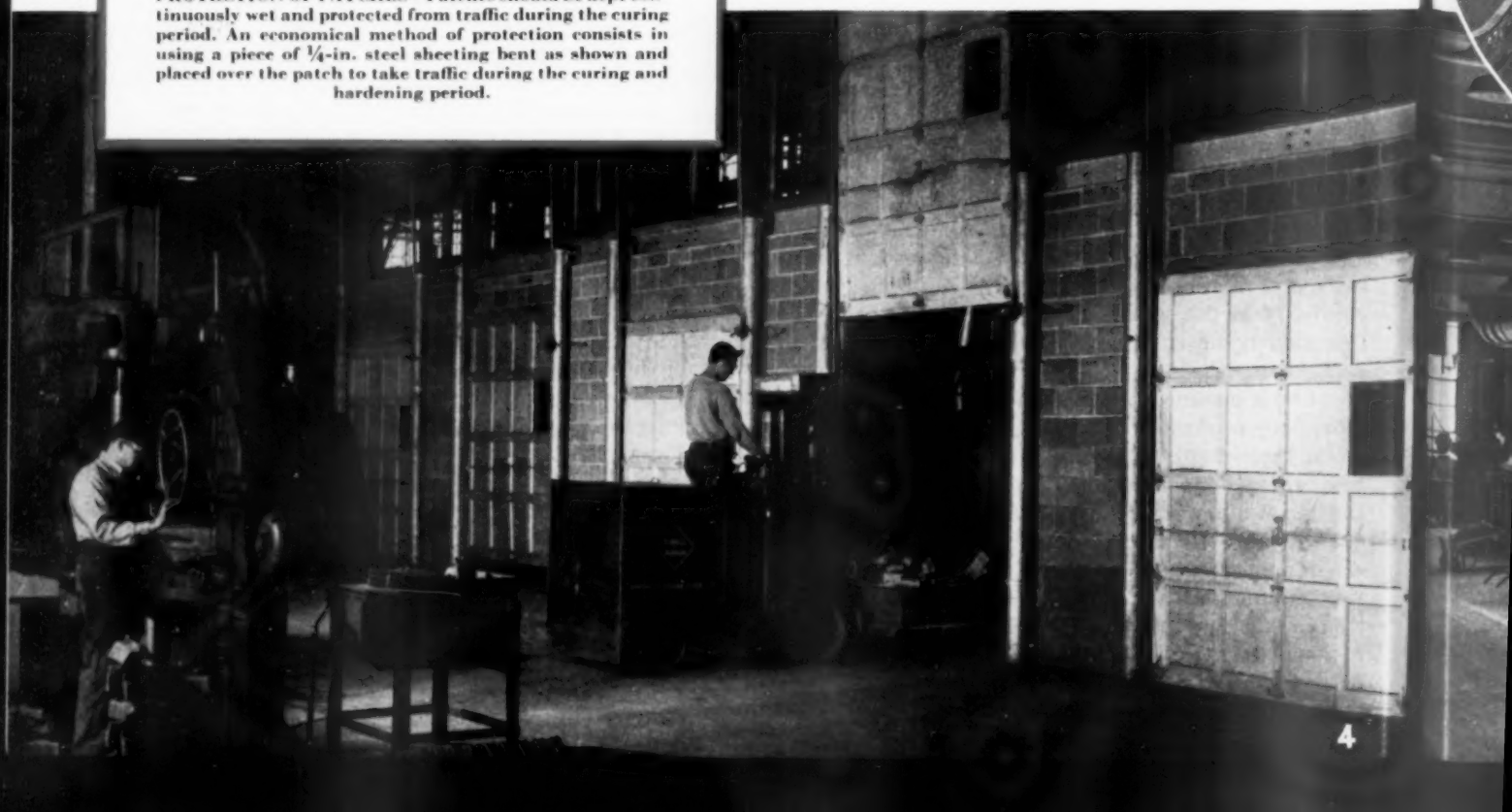
For the most part, the major factor is *quantity* of light. Whether natural or artificial, the amount of useful light in the work area should conform to the minimum standards as established by the Illuminating Engineering Society in collaboration with representatives from insurance firms, manufacturers of lighting equipment, purchasers of such equipment, government bureaus, and others working through the standards machinery of the American Standards Association Inc. Minimum footcandle values of illumination (readings taken with light meters 30 inches from the floor), as reprinted from the ASA standard are shown in the accompanying table. These are minimum standards; higher foot-candle values will do no harm, provided there is no glare (defined as any brightness within the field of vision of such character as to cause discomfort, annoyance, interference with vision or eye fatigue); no sharp, contrasting shadows; and no maldistribution of light.

Factors to be considered in foundry lighting are summarized as follows:

1. Plant areas checked with light meter to determine whether minimum foot-candle values are being followed. Public utilities in most communities do this job free of charge for industrial customers. Readings should be taken at various times of day and under differing weather conditions.

2. Glare caused by sunlight, bare bulbs, improperly shielded lamps, reflected light and other sources are discovered and rectified. Adjusting height of lumi-

Fig. 3—How to best maintain concrete floors
Fig. 4—Enclosing tumbling mills helps cut noise
Fig. 5—Use of grid floors assists in reducing the foundry dust problem
Fig. 6—Evidence of good housekeeping in the cleaning department's bench grinding section



naires above eye level of workers, use of shades or blinds on windows and skylights, purchase of suitable nonglaring light fixtures, or relocation of work benches and machines to avoid glare may be some of the measures to be taken.

3. Supplementary lighting provided for specific tasks requiring greater foot-candle power.

4. Lighting system adequately maintained. Dirt and grime on lamps and fixtures may reduce the amount of useful light by 20 per cent, dirty walls will deduct another 12 per cent, burned-out lamps or lamps of improper voltages may account for another 19 per cent reduction—hence, maintenance is more than a matter of appearance, it is also a common-sense economy move. Where natural lighting is utilized, dirty windows may reduce by more than half useful light within the foundry.

5. Sharp contrasts of light and dark are eliminated by installing additional light sources, relocating luminaires, repainting and proper maintenance.

6. Vibrating lights, which create difficult seeing conditions because of jumping shadows, are eliminated by use of shock mountings (*Please turn to page* 186)

Recommended Foundry Illumination

(ASA standard)

Foundry Areas	Minimum Footcandles in Service
Freight elevator	10
Inspection, rough	20
Inspection, medium	30
Inspection, fine	*20
Locker rooms	10
Rough bench and machine work	20
Medium bench and machine work (rough grinding, medium buffing and polishing)	30
Fine bench and machine work (medium grinding, fine buffing and polishing)	*20
Extra fine bench and machine work	*20
Office:	
Bookkeeping, typing, accounting	50
Business machines	*20
Conference rooms	25
Corridors and stairways	5
Desk work—intermittent reading and writing	25
Desk work—prolonged close work	50
Desk work—reading blueprints and plans	30
Drafting—close work	50
Drafting—rough drawing and sketching	30
Filing and index reference	25
Lobby	10
Mail sorting	25
Reception rooms	10
Packing and boxing	10
Boilers, coal and ash handling	5
Auxiliary equipment, oil switches, transformers	10
Engines, generators, blowers, compressors	20
Receiving and shipping	10
Store and stock rooms:	
Rough bulky material	5
Medium and fine material requiring care	10
Testing:	
Rough	20
Fine	30
Extra fine instruments	*20
Toilets and wash rooms	10
Warehouse	5
Welding	30

* Plus supplementary lighting at job.

Equipment to simplify and make more effective the economical addition of soda ash to cupola iron is described by the author. The process is intended not only to promote intimate contact between the molten metal and desulphurizing agent, but also to assist in slag separation

DEVELOPS NEW TYPE UNIT FOR Desulphurizing Cu

By FRANK E. BATES
Foundry Consultant
Solvay Sales Division
Allied Chemical & Dye Corp., New York

DURING the last several years gray iron foundries were afflicted with rising sulphur content in their cupola iron, due to the poor quality of scrap and coke available. To hold the sulphur content within a satisfactory range, desulphurizing by addition of various types of sodium carbonate reagents at the ladles, in the cupolas or at the mixing ladle was practiced with reasonable success. Of course, as the sulphur increased, larger additions of desulphurizing agents were required, particularly during the latter part of 1947 when sulphur content of the iron over the spout reached an unprecedented level.

The resulting formation of large amounts of slag caused by heavy desulphurizing addition created problems not only in slag disposal but also in preventing some slag from being carried over to the molds and becoming entrained in the castings. Various schemes were tried to eliminate the trouble with slag inclusions without much success. Their formation was attributed to a combination of the length of period needed for reaction of the alkali with the sulphur, as well as the time required for coalescence of the finely divided reaction products into particles which would float to the surface of the molten metal. While the time allowed for their occurrence was extended, it could not go beyond that at which the minimum pouring temperature was reached in the ladle, and slag inclusion could not be eliminated entirely.

Small Unit Is Satisfactory

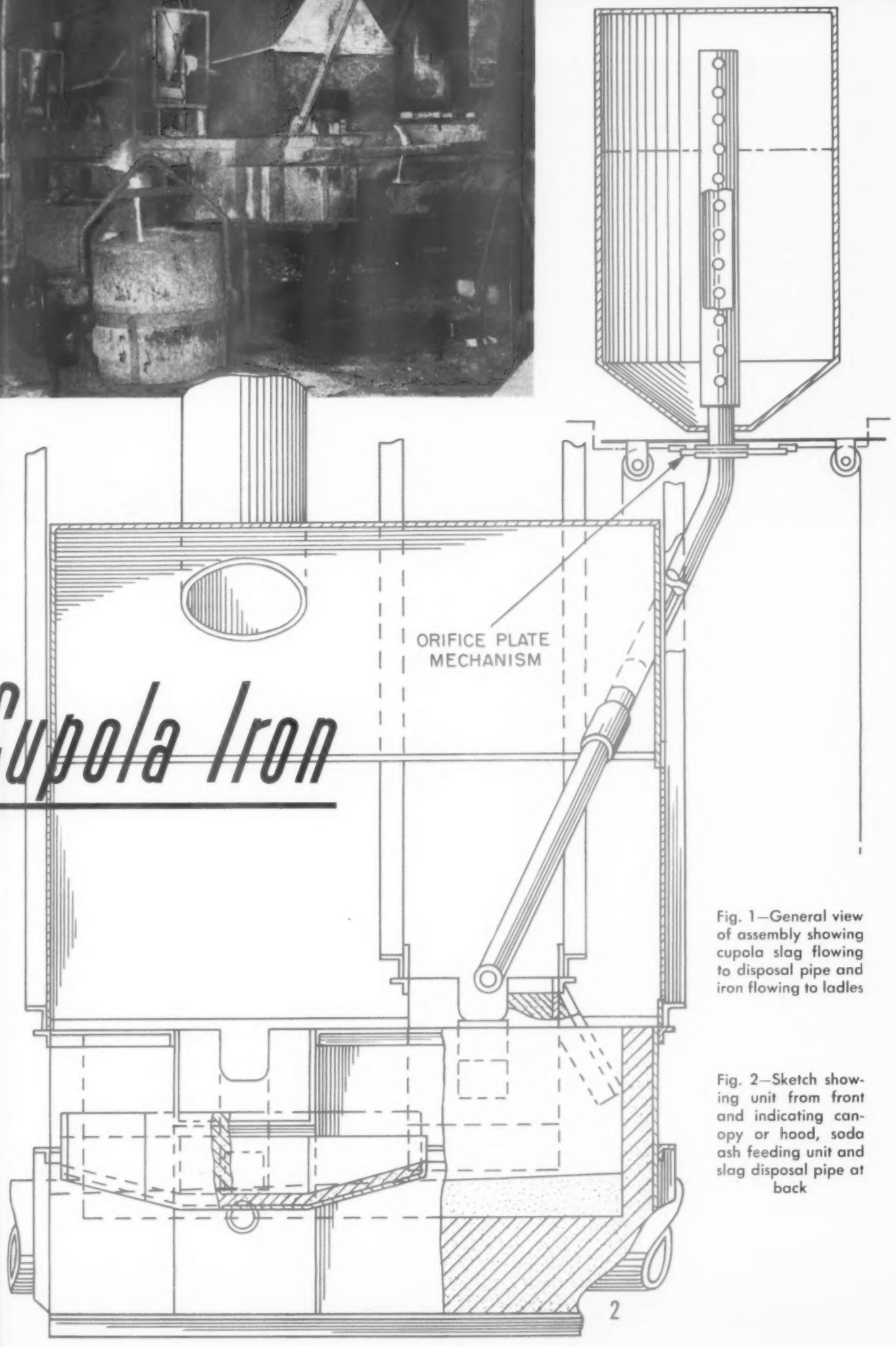
In 1947 the writer installed in a small foundry a unit that would automatically feed the desulphurizing agent, as well as dispose of the slag. The iron from this desulphurizing unit was cleaner and the temperature had not been affected. After experiencing the satisfaction that this unit would actually reduce the content of the sulphur and would give the thorough contact time of the agent with the metal, the writer, at that time associated with the Worthington Pump & Machinery Corp., Buffalo Works, as melting supervisor, suggested installation of one of these units.

The basin of the unit was designed to hold around 3000 lb of iron or 1½ charges as melted. At the prevailing rates of melting and pouring, such an amount of metal would remain in the unit about 10 minutes, which would be sufficient to permit effective contact with the desulphrizing agent for reduction of the sulphur within reasonable limits. The desulphurizing agent (soda ash) was delivered by hand every five minutes during the heat. The soda ash slag would automatically flow to the disposal wet system employed on the front slagging cupola. The unit was covered with a canopy that insured removal of fumes.

It may be observed in the sketches and other accompanying illustrations that the desulphurizing unit is located in front of the cupola in such a manner that the molten metal from the cupola spout is required to traverse the basin channel for a distance of about 2 ft, with sharp directional changes at the entrance and exit points. These changes in direction result in considerable turbulence which is believed to aid considerably in an effective interfacial contact between the molten metal and the desulphurizing agent at the entrance, and good separation of slag and metal at the exit.

The cupola is the front slagging type, and the slag is removed by discharging it into an opening in a 12-in. diam steel pipe through which a stream of water flows rapidly. The water effectively granulates the slag and carries it to a sump behind the cupola from which it is removed periodically. Similarly the spent soda slag from the desulphurizing unit is discharged into the same pipe as indicated in Fig. 6. Also, as may be observed in this and the other illustrations, the unit as well as the front slagging spout is covered with a hood which effectively removes the smoke and fumes at those points.

Following installation of the unit, the desulphuriz-



Cupola Iron

Fig. 1—General view of assembly showing cupola slag flowing to disposal pipe and iron flowing to ladles

Fig. 2—Sketch showing unit from front and indicating canopy or hood, soda ash feeding unit and slag disposal pipe at back

Fig. 3—Showing arrangement of pipe in back of the unit for wet system disposal of slag
Fig. 4—Opening in the hood at left shows soda ash being discharged into the metal bath, while at the right slag may be seen flowing into the discharge pipe

ing agent was added by hand. To facilitate the operation and to insure proper placement of the desulphurizer, a small chute was constructed of sheet steel and directed so that the material being fed in dropped into the molten metal bath at the point where the metal from the spout flowed into the basin. Because of the high sulphur content of the iron, the operator making the desulphurizing additions was kept busy, since every 5 minutes 18 lb was required.

Effectiveness of the arrangement of the unit and desulphurizing procedure was indicated by the reduction of sulphur from a range of 0.320 to 0.290 per cent at the spout to 0.150 to 0.140 per cent in the ladles. First attempts involved use of desulphurizer in block or pig form at the rate of 10 lb per ton of iron, one-fourth of the amount being added every 15 minutes. While the sulphur content was reduced, the percentage reduction was only from 11.6 to 29.6 per cent. Then it was decided to make the additions every 5 minutes instead of 15 minutes, and a noticeable improvement in sulphur reduction was secured; the percentages ranged from 15.7 to 61.5. However, the variation was too great so the amount of desulphurizer was increased to 14 lb per ton, and with the required additions being made every 5 minutes, the fluctuation between maximum and minimum sulphur reduction was reduced considerably to the range of 33.2 to 48.5 per cent. Since uniformity was desired, that schedule was followed.

While the manual addition of the desulphurizer gave satisfactory results, it soon became obvious that cost of the desulphurizing operation could be reduced considerably by substituting automatic for manual addition. After considering and discarding several ideas whereby additions could be made automatically, it was decided to try the use of dense, granular soda ash. The granular form permitted the material to be placed in a tank or hopper from which it could be discharged by gravity continuously or intermittently.

Consequently, a hopper was placed in an elevated

TABLE I—Orifice Size and Feeding Rate

Diam. in.	Lb per Minute	Lb per Hour	Melting Rate, Tons per Hour	Lb per Ton
¼	½	30	15	2
5/16	1	60	15	4
⅜	2	120	15	8
½	4	240	15	16
¾	10	600	15	40
1	20	1200	15	80

TABLE II—Percentage Sulphur Reduction

Orifice Diam. in.	¼	5/16	⅜	½	¾	1
Approximate Reduction, per cent	15 to 20	20 to 30	30 to 40	40 to 50	50 to 60	60 to 80

For uniform sulphur in the range 0.060 to 0.100 per cent with present coke and scrap the 5/16 and ⅜-in. orifices are used.

TABLE III—Typical Sulphur Analyses Obtained

Iron Over Spout	After Desulphurizing	Reduction	Per Cent
0.325	0.150	0.175	53.8
0.324	0.178	0.146	46.5
0.300	0.166	0.134	44.6
0.292	0.178	0.114	39.0
0.275	0.155	0.120	43.5
0.260	0.125	0.135	51.8
0.210	0.103	0.107	50.7
0.187	0.082	0.105	55.9
0.152	0.064	0.088	58.2
0.136	0.051	0.085	62.4

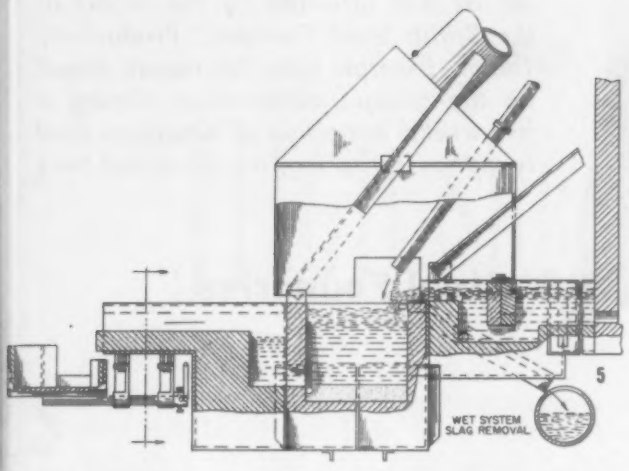


Fig. 5—Sketch showing side view of unit

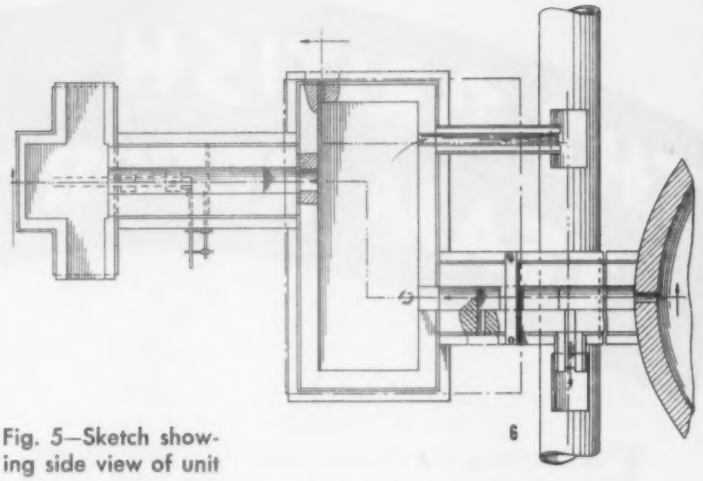


Fig. 6 — Unit viewed from the top

position above the desulphurizing unit with a pipe leading down to where the metal from the spout flowed into the bath. Results obtained indicated that addition of dense, granular soda ash in that manner was extremely effective in removing sulphur. Further study indicated that the quantity of sulphur removed was in direct proportion to the amount of soda ash employed. Hence, it was advisable to have some means of controlling the addition so that large, small or intermediate quantities could be admitted to the bath.

The orifice method, consisting of a plate containing several different size holes which could be inserted in the outlet tube from the hopper, was adopted for that purpose. Following some investigation, rates of flow for various size openings were determined, and the selected hole sizes with their corresponding rates are shown in Table I.

The orifice plate is placed just below the hopper, as indicated in Fig. 2, and arranged so that any desired opening may be used and changes made without interrupting the flow for more than a few seconds. Additionally, as shown in the illustration, the outlet tube extends up into the hopper, and is perforated with holes to provide free flow and to eliminate any tendency of the material to pack or hang.

In operation the hopper, which has a capacity of about 10 cu ft and holds 600 lb granular soda ash, is located on the cupola charging floor where it can be filled easily. Feeding tube to the desulphurizing unit is 2 in. diam, and slopes down to the desulphurizing unit. No difficulty has been encountered in obtaining a smooth, uniform flow of material. Data obtained in over a year's operation indicate that the percentage of sulphur removal with the various orifice openings is as indicated in Table II. Typical results obtained during the past year are shown in Table III.

From time to time sulphurs as low as 0.035 per cent have been obtained, but no extended work has been done to obtain such results in regular daily runs, since the range 0.06 to 0.100 per cent is satisfactory for the castings produced. It might be pointed out that cost of sulphur removal is an important item in castings production, and the endeavor is to provide a suitable sulphur level at the lowest possible cost. However, brief runs have indicated that sulphurs as low as 0.03 per cent can be obtained with the procedure in regular production by addition of a sufficient quantity of dense, granular soda ash. Sulphur contents as low as that also can be obtained by double desulphurization. For example, iron from the desulphurizing unit containing 0.071 per cent S was given a further treatment in the ladle with dense soda ash, and it was found that the sulphur dropped to 0.03 per cent. The latter procedure appears to have attraction for those desiring an intermittent supply of low-sulphur gray iron for the manufacture of nodular graphite iron.

Success obtained with the first desulphurizing unit led to equipping a second cupola with a similar unit, as shown in Fig. 1. It may be observed that the unit in operation at the right provides a clear, fume-free atmosphere at the cupola. Fig. 3 shows the discharge of spent slag from the unit into the wet-system slag disposal pipe. Depth of iron in the unit is around 12 in., and the depth of slag about 5 in. Fig. 4 depicts the slag from the front slagging cupola spout flowing into the wet-system disposal pipe at the right. In the opening in the hood in the center of the illustration the feed pipe for the soda ash can be seen discharging into the molten metal bath at the point where the cupola metal enters.

A patent application has been filed covering the design and use of this desulphurizing unit.

THE BRITISH TEAM REPORTS

On U. S. Steel Foundries

Rarely is an industry given the opportunity to "see ourselves as others see us" as that afforded by the report of the British Steel Founders' Productivity Team. Excerpts from this report, based on the group's observations during a five-weeks' inspection of American steel foundries last spring, are presented here

LAST spring the British Steel Founders' Productivity Team of 16 men spent five weeks visiting steel foundries in the United States. A remarkably complete and frank report on the Team's observations, conclusions and recommendations to British industry is incorporated in a 108-page book just published by the Anglo-American Council on Productivity, 21 Tothill St., London, under whose auspices the visit was organized.

Numerous sketches and tables supplement the detailed discussion on practically all phases of steel foundry operations in this country. The report analyzes at length the obvious reasons why productivity per man-hour in steel foundries of the United States is 50 to 90 per cent higher than in Great Britain. Principal factors given for this are: Widespread use of machines and economy in use of labor, standardization of product, good factory layout and orderly floors, and application of research.

Because of its comprehensive nature, the report does not lend itself well to condensation. However, many of the observations on American facilities and methods will be of considerable interest to foundrymen of this country, and are presented verbatim in the following paragraphs. Since criticism often is more useful than praise, an attempt has been made to include most of the relatively few comments which could be considered critical of American practices.

Craftsmanship—To state that the U. S. foundries are practically devoid of skilled craftsmen, although superficially true, gives a completely false impression.

Good steel castings (and the Americans produce high quality, without a doubt) cannot be produced without skill of a high order. But the exercise of skill has been taken from the shop floor into the pattern shop, the methods office and the brains of the supervisors. A supply of skilled foundrymen being lacking, the U. S. foundries have set about making steel castings in such a way that skilled molders are not required except for a vanishing percentage of the work.

Even small runs—as few as eight off one pattern—are mounted for machine molding. The skill is thus absorbed in a proper layout of the pattern on the board, complete with gates and heads; and even the position of nails, fillet-chills and chaplets may be marked on the pattern so that no judgment has to be exercised by the molder. Machine-molding skill then resolves itself into the ability to go through the prescribed movements with the least expenditure of effort and time. But skill, in the sense of ability to plan the production methods required to produce sound castings without wastage of material, remains very much in evidence.

Safety—Thus far the Team has high admiration for the efforts of the Americans in regard to safety. In the shops, however, a sacrifice of safety for the sake of speed was frequently observed. The widespread use of lifting magnets and their operation on cranes moving at very high speeds, together with the technique of "snatching" castings with the magnet, look as though they hold most of the elements of danger. Careless stacking of boxes (flasks) was noted on several occasions. In spite of this, the accident rate is reported to have fallen from an index figure of 45 to 27 in the past five years.

In general safety measures, American practice still lags behind the British but in some respects has gained the lead. A stricter attention to chain repairing and annealing by competent craftsmen would probably increase the safety margin of much of the lifting in U. S. steel foundries.

Wages—To compare the wages earned with those in force in Britain, it is not sufficient simply to apply the dollar/sterling exchange rate. The cost of most of the necessities of life is much higher than in Britain, and after making allowance for such apparent luxuries as refrigerators and motor cars (which are near-necessities because of climatic and transport conditions) the American foundry worker does not appear to enjoy a standard of living very much higher than the British. It is slightly higher, but less secure.

Employee Facilities—Washing facilities and locker rooms are regularly provided in American foundries adjacent to the workplaces. It is the practice for Americans to leave their place of work cleanly dressed, the dirt and grime having been washed away. Without provision of good washing facilities, recruitment to the foundries would be far below requirements. In the regularity of this provision American practice is ahead of British (*Please turn to page* 172)

Why not use more HIGH SHRINKAGE BRONZE?

SEVERE competion in the metal field demands that each supply division looks to its laurels. Steel, cast iron, wrought iron, malleable iron, welded assemblies, forgings, extrusion products ferrous and nonferrous, white metals, light metals, and powdered metals, plating and the newer metals such as titanium —all these are competitors of brass and bronze castings.

If the use of brass and bronze castings is to increase, the engineer designer must have reason to feel that he can place just as much confidence in the nonferrous cast product as in the forged or extruded ferrous or nonferrous product. He must also be able to get equal strength, hardness and shock resistance.

In the past both ferrous and bronze foundries have been too prone to be content with a product that satisfied the customer rather than themselves. If the casting had no outward visible sign of imperfection the foundry was glad to ship it, instead of having a high standard that would require the breaking of the first casting in order to be sure that it was "honestly good all the way through."

Today we have increased facilities for nondestructive testing but many foundries dislike the expense involved. A machine capable of breaking all but the unusually large castings should be a part of the equipment of every bronze foundry. (The phrase "bronze foundry" is intended in this article to include brass wherever the same is applicable.)

If only one test were available for foundry information, the fracture test would be the writer's choice as, in his opinion, it gives more information to the average foundryman and metallurgist than any other.

Now how can the bronze founder meet the requirements of the engineer designer? Load carrying capacity, either static or dynamic in tension or compression, is the main interest of the engineer. Steel is the material that is used more than any other. This being so, bronze equal in load-carrying capacity to steel is the logical alloy for the nonferrous foundry to offer.

This brings us to the aluminum and manganese bronzes as the best exponents of strength in general. The reason for this is the high shrinkage factor of these alloys. Just as the closing of the fist consolidates the muscular power of the arm and hand, so the shrinkage of an alloy consolidates its crystal structure. Thus we find steel stronger than iron, and aluminum and manganese bronzes stronger than the lower shrinkage alloys such as the tin bronzes.

Because too much emphasis has been laid on the increased difficulty of casting manganese and aluminum bronze, these have been side-stepped by the foundries wherever possible instead of being pushed forward as the natural competitor for steel. It is the writer's experience that these alloys are as susceptible to being made into good castings as any other alloy. However, certain points require attention, such as gating, risering and pouring methods.

Let us start at the beginning with manganese bronze. First as to composition. If the tensile requirement is 65,000 psi or under, lead up to 2 per cent is permissible. Not that one adds lead intentionally but because it is very apt to accumulate in the ordinary course of foundry practice. The amounts of aluminum, iron and manganese need not exceed 1 per cent each, and tin may not be required at all. Zinc will be in the neighborhood of 40 per cent, copper being the remainder. As the required tensile strength rises it is desirable to keep the lead below 1 per cent and increase the aluminum, iron and manganese to about 2 per cent.

Where a tensile of 100,000 psi or over is called for no lead should be permitted, and the aluminum, iron

By HAROLD J. ROAST
Consultant
Montreal, Que.

and manganese are increased to aluminum 5.5 per cent, iron 2.5 per cent, manganese 3.5 per cent with zinc 22.5 per cent and copper the remainder.

Having decided on the composition, the question arises—should the foundry make up the alloy with virgin metals, and if so should the metal be cast into ingots before making casting; or should the ingot be purchased from a reputable ingot maker? The writer made manganese bronze of 115,000 lb strength some twenty or more years ago, for use in his own foundry, but as soon as he could obtain reliable ingot he never resorted to making it himself. *The business of the foundry is to make castings not metal.*

Let us assume that we now have our ingot and are ready to melt it. We must remember that, unlike other alloys including aluminum bronze, manganese bronze has a highly volatile (*Please turn to page* 231)

Questions AND A

Use Thermit Method for Steel

Q.—Please advise where we can obtain information on thermit castings or steel castings.

A.—An excellent description of the method of making steel castings by the thermit process was presented in the August, 1947 issue of THE FOUNDRY under the title "Producing Steel Castings by the Thermit Process" by Robert C. Wayne. The material used is known as "casting thermit," and is of such composition to produce a steel of grade B composition (0.20 to 0.30 per cent C, 0.40 to 0.60 per cent Si, and 0.50 to 0.80 per cent Mn). Alloy steels can also be produced by suitable addition of alloying agents to the ladle or to the reaction crucible or both.

Casting thermit is placed in a hemispherical, bowl-like vessel called the reaction crucible, and ignited by means of ignition powder and a firecracker fuse. A short period of time is allowed for completion of the reaction, and the liquid steel is tapped from the bottom of the crucible into the pouring ladle. Reaction vessel is lined with magnesia refractories.

Includes Pig Iron in Charge

Q.—We are making steam and hot water sectional radiators, and wonder if you could give us some suggestions. We would like to get some pig iron to go with the scrap, but we do not know what analysis of pig we should order, and what amount to use. We are operating a small cupola using 100 lb charges of all scrap such as stoveplate, old stoves, boilers, etc.

A.—Composition of cast radiators is approximately 2.30 per cent Si, 0.55 per cent Mn, 0.55 per cent P, and 3.40 per cent TC, and presumably your combination of scrap material results in iron over the spout of about the same analysis. Substitution of pig iron for a like amount of scrap may take two forms; one the addition of regular foundry pig or use of high silicon pig or ferrosilicon. In the first case employing foundry pig iron, you could try 40 per cent pig containing 3.00 per cent Si with 60 per cent of the scrap you now are using which will give an iron over the spout containing about 2.30 per cent silicon.

In the case of high silicon or silvery pig, the amount would be 5 per cent of a pig containing 8 per cent Si with 95 per cent scrap. If ferrosilicon briquets are used the combination would be four 1-lb or two 2-lb briquets with 96 lb of scrap. Similarly if lump ferrosilicon is used the amount would be 7 lb of 75 per cent grade with 93 lb scrap.

However, to be sure as to the proper amounts of any of the suggested materials, it is advisable to have chemical analysis of your present iron as poured into radiators. From that it will be a simple matter to determine how much pig iron, etc. can be substituted, and what its composition should be. Also in case of changes in available scrap, you can make the necessary adjustments in quantity and composition to meet the desired requirements.

Fine Sand Prevents Gas Escape

Q.—We are trying to make castings out of fine local bank sand using dry-sand molding. We are experiencing some trouble in getting the gases and steam off, and wonder if you have any data on these. What should be the ingredients of the sand, and what is used for backing up the sand. Pieces we are trying to make run anywhere from 25 lb up 500 lb.

A.—As you indicate in your inquiry on the local bank sand, it is too fine for the type of work involved. Solution would be to use only a thin layer of that sand as a facing, and back it up with a much coarser grade of sand which will provide the desired permeability for the gases to escape. Backing sand may be a natural molding sand or a synthetic type made from sharp sand to which fireclay or bentonite is added.

Properties of the backing sand should be predicated on those desired for the heavy castings, and from that point of view the permeability should range from 70 to 100. In sands for dry sand molding, the bond content is higher than for green sand work, and in some cases additions of pitch or pitch and cereal are made.

Somewhat belatedly the question arises as to the source of the steam and gas you mention. If the molds are dried thoroughly no steam should be present, and unless the sand is contaminated with organic material there should be no gases generated. Only other possible source of gas would be from the cores, and if they are vented to the outside of the mold, no trouble should arise. If you are skin drying the mold surface rather than completely drying the mold, the trouble may arise from the dry skin not being thick enough, or allowing too long a period of time to elapse between drying and pouring.

ANSWERS

Wants To Use Aluminum Chips

Q.—Occasionally we pour light aluminum castings from all scrap, but have had no success in trying to use chips from lathe turnings. Can you suggest a method of using the chips and turnings?

A.—Usually chips and turnings are contaminated with oil, particles of steel and other debris, and for successful recovery of the aluminum content, they should be cleaned by removing as much of the oil as possible by centrifuging, and the steel by magnetic separation. Hence, you will be further ahead by selling the chips to a smelter who has the facilities for, and experience in handling the material.

However, if you want to try recovering the metallic value of the chips, the procedure is to form a molten heel 4 or 5 in. deep in the bottom of the crucible by melting heavy scrap. The heel should be covered with a flux composed of 45 per cent potassium chloride and 55 per cent sodium chloride, or a suitable proprietary "cleaning" flux. Small amounts of chips and turnings are added to the heel, pushing them below the surface until they dissolve. Additions should be made at intervals which permit the bath to remain liquid. If too much is added, or added too rapidly, the bath may freeze or become pasty. Cycle is continued until the pot is full of molten metal. Flux then is skimmed off and the metal degassed with dry nitrogen, chlorine or one of the proprietary dry salt fluxes.

Chips may be introduced by means of a large tube which is enlarged at the top to form a funnel. Lower end suitably coated with refractory is under the bath surface. Use of a plunger slightly smaller than the tube forces the chips under the bath surface.

Has Blows in Stack Molding

Q.— We are using the stack molding procedure and are having trouble with blowing. Flasks are 12 x 18 x 2½ in., and are stacked 11 high. Plate consists of five plain patterns 2 x 10 x ⅛-in. weighing approximately 1 lb each. A 1-in. sprue is used with a runner core at the top to facilitate pouring from the bull ladle. Approximately 90 per cent of the stacks blow within 30 seconds after pouring. Many combinations of venting have been tried without much success.

A.—In our opinion the cause of the molds blowing is improper sand conditions, but it is difficult to say just what particular feature is the primary culprit. Moisture may be too high or the sand too tight. It may be that through constant use, the bond of the sand has decreased to a point where a much greater squeeze is required to get a good lift. The high squeeze results in a denser sand with less permeability. Possibly the sand contains too high a quantity of fines which reduces permeability. A secondary effect of too much fines is that more water is required to provide the desired "feel" to the molder.

Look into the moisture situation and see whether decreasing it has the desired effect. Possibly you may have to open up the sand through addition of coarser material. Best method for determining what to do would be to take a small quantity of your present sand to make up say two stacks of molds. To that add a measured amount of coarse sand, and note the effect. Then add more on the next round, and continue until the desired results are accomplished. From that experimental work you will be able to determine exactly how much will be needed to convert all the sand in the foundry to the proper condition.

Desires To Use Clay for Mold

Q.—We are desirous of obtaining information pertaining to permanent molds using china clay, and would like to have references in books and articles.

A.—So far as we know molds cannot be made satisfactorily from clay alone unless use of chamotte might so be classified. In that practice a burned or calcined and graded bauxitic clay mixed with bonding clay is employed as the molding material instead of sand and clay. Possibly you might be able to

GANGWAY!

By J. A. PATTERSON

"Man howdy! If you can't get into some of the most heart rending predicaments!"

Questions AND ANSWERS

make a mold possessing some attributes of a permanent mold by mixing crushed firebrick with the clay and baking it at a high temperature. The material probably will be fragile, and suitable reinforcing means would be necessary.

Other possibilities are cement and sand, and silicate and sand mixtures. In the cement-sand mixture clay-free sand is mixed with about 10 per cent early-strength portland cement and 4½ per cent water. The mold is air-dried from 48 to 72 hours before use. For the silicate-sand mix the sand is mixed with tetraethyl silicate or silicate of soda (water glass), allowed to air dry, and then baked at high temperature.

Castings Show Chilled Areas

Q.—In the past we have been using pig iron, purchased scrap, return scrap, and steel rail scrap in our cupola, but recently eliminated use of purchased scrap to obtain better composition control. Results have been rather good with the exception that we are experiencing chilling and hard edges. Present mixture is 400 lb pig iron at 2.13 per cent Si, 300 lb steel rail, and 300 lb return scrap at 1.52 per cent Si, 2 silvery piglets containing 2 lb Si each. We are trying to hold the Si in the charge to 1.50 ±0.10 per cent, and a typical analysis shows 3.35 per cent TC, 2.68 per cent GC, 0.67 per cent CC, 1.52 per cent Si, 0.78 per cent Mn, 0.05 per cent S, and 0.09 per cent P. We are using this in castings requiring a bhn of 207 to 235. One casting has an oval flange ⅝-in. thick and a square flange 1 in. thick. Without using alloys the oval flange has been hard and showing some chill, bhn 255-169; the square flange 217-228. Using 0.50 per cent Mo and 0.50 per cent Ni in the mixture, we get 217-228 bhn in both flanges. Some of the other castings show a 196-207 bhn. It seems as though with the new mixture we get more chilling or the scale on the casting is harder. Why?

A.—Your trouble with parts of the casting showing considerable differences in brinell hardness and in hard edges is due essentially to the differences in cooling rate between the ⅝-in. thick flange and the 1-in. thick flange. The former naturally cools almost twice as fast as the latter, and the difference may be even more if the thinner section is located much farther away from the gate than the thicker section. Composition of the iron used undoubtedly is designed for castings 1 in. thick or more and is subject to what is called section or thickness sensitivity. That is, it will serve satisfactorily where the section is not less than 1 in. thick, but results in chilled areas or edges when the section is much less than that thickness.

This is indicated by the fact that addition of nickel and molybdenum eliminates the trouble. The nickel acts as a graphitizing agent, and the molybdenum decreases section sensitivity. You probably could eliminate the difficulty by increasing the silicon content slightly, but that might result in trouble in the heavier section castings. Best procedure would be to use one of the various graphitizing inoculants. These include graphite, ferrosilicon, silicon-titanium-calcium, nickel-silcon, silicon-manganese-zirconium etc., and are added to the ladle. These would be used, of course, only in the iron for the castings with which you are having trouble. You will have to experiment with the amount to be added to obtain the desired results, and you might try adding 2 to 4 oz per 100 lb of iron as a start.

Wants Data on Small Cupolas

Q.—We are contemplating installation of a 24-in. ID or smaller cupola, and would like reference data on the operation of small cupolas as well as practical suggestions. Could you list available references?

A.—A cupola 24-in. or more generally 23-in. ID usually has a 32-in. shell lined with a single row of 4½-in. brick, and melts around 1½ tons per hour. It may be designed with four or six tuyeres, preferably six to give a better blast distribution. If six tuyeres are used they should be 3 in. high and 5 in. wide, and if four are employed they should be 3½ in. high and 6 in. wide. Air blast supplied should be 940 cfm. Bed height may range from 36 to 42 in. above tops of the tuyeres. Coke splits for melting should be 35 lb, and the iron charge 280 lb for a ratio of 1 to 8. If other ratios are desired, the coke should be held constant, and the iron weight varied.

Smallest size cupola commercially made is one with a 27-in. steel shell which is lined down to 18 in. by a single 4½-in. brick layer, and melts about 1 ton per hour. Bed coke height ranges from 28 to 34 in. The coke split is 20 lb, and the iron charge based on that in the particular ratio desired. Air supply is 570 cfm. As far as various features concerned with operating a cupola are concerned, we believe that you should obtain a copy of the *Handbook of Cupola Operation*, and study the the various chapters contained therein. It comprises 24 chapters discussing every detail relating to construction and operation, etc.

Soil Pipe Is Thin in Center

Q.—We are having difficulty in casting 3-in. soil pipe. We are using cast iron arbors which are placed in a core knife, the sand falling through a hopper while the arbor is revolved, thus making a perfectly straight core. Our pipes are perfectly uniform on each end, yet some of them are thin on one side in the middle of the pipe, and some cut off completely. Our only solution is that some of the arbors are warped, causing more sand to be on one side of the arbor than the other. Still we cannot understand what reaction takes place while the mold is being poured, for the arbors are perfectly rigid. Our analysis of iron averages 2.05 per cent Si, 0.77 per cent P, 0.55 per cent Mn, 3.30 per cent TC, and 0.10 per cent S. Another thing we do not understand is that losses vary each day from 1 to 8 per cent.

A.—While to all intents and purposes the arbors in your pipe appear rigid, the results obtained in production indicate otherwise. Since no information is given on the size and thickness of the arbors, it might

(*Concluded on page* 98)

Mechanize Your Sand Preparation

WITH A

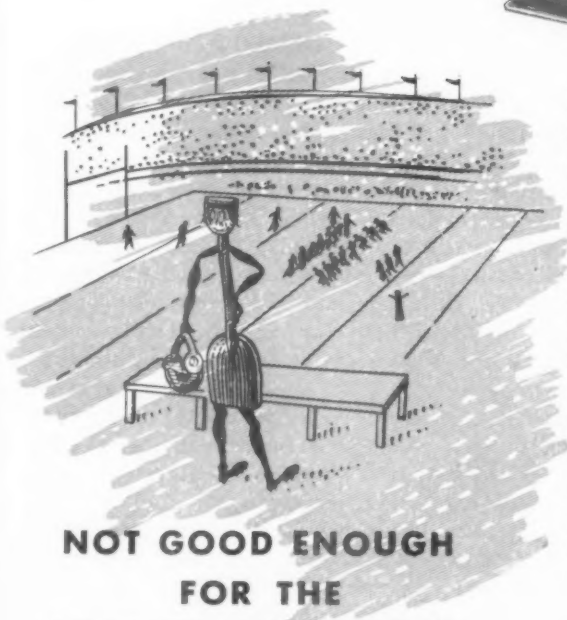
SELF-LOADING

SELF-PROPELLED

ROYER

SAND

CONDITIONER



NOT GOOD ENOUGH FOR THE 1949 FOUNDRY TEAM

Hand power has not been able to compete with machinery in most industrial operations. How long do you suppose hand shovelling of foundry sand can compete against the new self-loading, self-propelled ROYER SAND CONDITIONER . . . which turns out 50 tons per hour of molding and core sand . . . sand that is completely trash-free . . . sand that is perfectly blended, cooled, de-gassed . . . ready for immediate use or suitable for storage? If your foundry handles sand in large volume it will surprise you to learn how much less your sand preparation will cost when you use the new ROYER SAND CONDITIONER. We will be glad to send you actual production data for comparison with your own operations. Write today.

ROYER

FOREMOST IN SAND CONDITIONING EQUIPMENT

ROYER FOUNDRY & MACHINE CO.

159 PRINGLE ST., KINGSTON, PA.

Questions AND ANSWERS

(*Concluded from page* 96)

be that these are not stiff enough to resist the hydro or ferrostatic pressure developed as the molten metal is poured into the mold. Possibly the variation in loss from day to day might result from speed of pouring as hard pouring tends to create greater pressure than normal or easy pouring.

You mention that some of the arbors may be warped, but it seems to us that they cannot be warped very much or you would have difficulty in coating them with sand due to wobble and vibration. Neither is mention made of the gating system employed. Usual method is to use a long runner between two pipes in a flask with branches into the pipes, and four down sprues which are filled simultaneously from a four-lip ladle. Possibly if you are trying to use a single sprue, the section of the mold at that point might be raised to a high temperature resulting in expansion and warpage of the core arbor.

Trouble might be overcome by using longer arbors which extend beyond the flask edges, and brackets attached to the flask. A wedge driven on the underside of the arbor between the ends and the brackets will spring the center of the arbor down. However, you will have to do some experimenting to determine how much springing will be needed.

Face Casting With Abrasive

Q.—Some time ago in THE FOUNDRY we read a description of the method employed in producing an abrasive face on door sill castings. Since we no longer have this particular copy of THE FOUNDRY we shall appreciate your kindness in supplying a clipping, or information in any other form. What is the best aluminum mixture for these castings?

A.—While the process of applying an abrasive face to aluminum castings is fairly simple and elementary, the actual performance involves considerable skill and experience. You probably won't hit it right in the first few attempts. Probably the most important feature, and this is a point over which the average foundryman will hesitate, is to pour the metal at maximum temperature. That means higher temperature than is necessary for ordinary sand casting. The metal must be extra hot and fluid to penetrate, fuse and grip the grains of abrasive.

Essentially the procedure is to coat the mold face with some type of adhesive, molasses water, thin claywash, sulphite liquor binder, solution of bentonite in water with or without sodium silicate (water glass), or others of a somewhat similar character. The best method of applying the adhesive material to obtain uniform thickness for a minimum amount is to spray it on the face, instead of using a brush or a swab. Abrasive grit, which usually is silicon carbide in 30 to 36 grain size, is screened or sifted over the sticky mold surface in a uniform thin layer. The sieve or screen is the same mesh as the abrasive material. The abrasive layer should be thin. It may be advisable or necessary to spray the first layer with adhesive and then apply a second abrasive layer. The coated surface is skin dried in any convenient manner, with preference for an oil or gas torch. Drying drives the moisture away from the face so that molten metal will lie against it quietly.

Satisfactory castings can be produced from any one of a wide range of alloys in the aluminum-copper-silicon group. An alloy that finds wide acceptance contains copper 7 per cent, silicon 2 per cent, zinc 1.7 per cent, remainder aluminum.

Melting Steel in Crucibles

Q.—We operate a foundry in India and manufacture various types of pumps. We want to make pumps in either austenitic nickel-chromium stainless steel or austenitic nickel-chromium cast iron. Can you supply us with instructions on how to melt those metals in crucibles, and with technical data on molding and sand preparation?

A.—Manufacture of steel by the crucible process takes considerable time and experience. Since it is purely a melting operation, the raw materials must be low in sulphur and phosphorus, and in the case of the austenitic steel (18 per cent chromium, 8 per cent nickel) which you contemplate making, the carbon also must be low. With that material either clay-lined graphite crucibles, or clay crucibles must be used to eliminate carbon pickup. Furnace must be deep to provide sufficient depth of fuel so that steel will melt, and after a couple of hours the crucible must be lifted, the live fuel around the pot poked beneath, and additional fuel shoveled in around the sides. Melting requires 4 to 5 hours for a 90-lb pot, using forced draft.

Molding sand for the castings preferably should be a synthetic one which can be adjusted to obtain the most suitable properties for the type of castings to be produced. A high grade, clean silica sand of 60 to 80 AFS fineness with 4 per cent bentonite and 1 per cent cereal with 3 to 4 per cent moisture is said to be suitable for bench work. Without any information on the type of pump casting, no suggestions can be made on molding and gating except to say that adequate risers should be employed to provide feed during solidification, and the gating system arranged to insure progressive freezing or directional solidification.

The austenitic cast iron can be melted in graphite crucibles since it contains a considerable amount of carbon. While its melting range is lower than that of steel, the same requirements as to fuel bed, etc. will apply. Shrinkage of the 14 per cent nickel, 6 per cent copper, 2 per cent chromium alloy is between gray iron and steel, and should be considered in gating and risering. As in the case of steel close attention should be given to obtaining directional solidification. Molding sands similar to those used for comparable gray iron sections should be suitable. Equipment and methods for melting ferrous metals in crucibles, differ in many respects from those employed in melting nonferrous metals. A much higher temperature must be developed in the furnace.

Suppose your foundry employed less than 100 . . .

If your foundry employed less than 100 workers, would you load ferrous metal into charging buckets by hand—or with a magnet?

There is only one profitable answer to this question when you consider the high cost of today's labor. Yet, thousands of medium-size foundries continue to handle scrap, rails and pig *by hand* in the melt department. *The money they waste would pay for a lifting magnet in a few short months.*

An Ohio lifting magnet is the lowest cost—and fastest—way to make up the charge. Foundry cost records prove this statement. Flexibility? A capable crane operator drops the load piece by piece for "last pound" accuracy.

Save time . . . save money by turning costly man-hours into profitable magnet-minutes. Write to Ohio—*25 years a leader in magnetic materials handling.*

How would you load charging buckets?

SELECT YOUR MAGNET from two Ohio types. The PROTECTO-WELD magnet, shown above, is made in 39, 46, 55 and 65-inch diameters. Bolted construction types include these and other smaller sizes. Ohio also builds magnet control equipment.

5 TYPICAL JOBS WHERE OHIO MAGNETS CUT COSTS

- unloading scrap, rails and pig iron.
- loading charging cars, hoppers and buckets.
- loading and unloading annealing cars.
- moving bulky castings in cleaning dept.
- picking up sprues, gates, runners, overflow.

THE OHIO ELECTRIC MFG. CO. • 5900 MAURICE AVENUE • CLEVELAND 4, OHIO

Ohio MAGNETS

A-2016

Men OF INDUSTRY

A. J. EDGAR has been appointed general manager of Hunt-Spiller Mfg. Co., Boston, producer of gray iron and steel castings. Mr. Edgar for the last three years has been works manager, Benton Harbor Malleable Industries Inc., Benton Harbor, Mich. A graduate of Michigan State College, he joined Saginaw Malleable Iron Division, General Motors Corp., Saginaw, Mich., in 1932, where he worked in all foundry departments. He joined Steel Sales Corp., Chicago, in 1936, and was engaged in distributing products of International Nickel Co., as well as acting as foundry engineer in development of alloy cast iron. He was foundry superintendent, General Railway Signal Co., Rochester, N. Y., prior to joining Gray Iron Founders' Society, which he served as technical advisor from 1942 to 1946, in Washington.

♦ ♦ ♦

Richard H. Bancroft has been appointed executive engineer, Perfect Circle Corp., Hagerstown, Ind., assuming the position left vacant by the retirement of Macy Teetor in 1946. **Dan Teetor,** who has been acting head of the engineering division since the latters' retirement, continues as vice president and a member of the executive committee. Mr. Bancroft, who joined Perfect Circle Co. in 1931, has been castings plant manager for the past year, in charge of the company's foundry in New Castle, Ind., and the sleeve castings plant in Richmond, Ind. **Dallas F. Lumsford** succeeds Mr. Bancroft as head of the foundry, and **Robert C. Myers,** formerly assistant manager of the sleeve castings plant, becomes head of that organization.

♦ ♦ ♦

R. A. J. Wellington has been named national sales manager, Precision Metalsmiths Inc., Cleveland. Mr. Wellington, who has been in charge of home office sales of the company for the past 6 years, will assume direction of its representatives located in industrial areas throughout the country. A graduate of Worcester Polytechnic Institute, he was engaged in the machine tool industry for 20 years. During the war he was manager of the Cleveland branch of the Office of Production Management.

♦ ♦ ♦

Edward R. Cole has been elected a vice president of United Carbon Products Co., Bay City, Mich., in charge of engineering and production in the graphite anode division. Following graduation from Purdue University, Mr. Cole spent 3 years with General Electric Co., Schenectady, N. Y., 21 years with the Acheson Graphite Corp., Niagara Falls, N. Y., and 4 years as a consulting engineer. For the past 13 years he has been associated with Dow Chemical Co., Midland, Mich., where he designed and built a special section of the plant for production of graphite electrodes.

♦ ♦ ♦

William J. Sparling, since 1945 works manager, Chain Belt Co., Milwaukee, has been elected vice president and manager of its chain and transmission division. Mr. Sparling, a graduate of Michigan State College of Agriculture and Applied Science, joined the company in 1928 as a student engineer. He was in charge of the metallurgical laboratory until 1934, when he was appointed assistant to the chief engineer of the chain and transmission division. He became assistant works manager in 1938. **E. P. Meyer** succeeds Mr. Sparling as works manager. Mr. Meyer, who joined Chain Belt Co. in 1920, has served as foundry superintendent and in other supervisory positions, more recently as assistant works manager.

♦ ♦ ♦

William E. Madden, recently elected vice president, has been named general sales manager, George Haiss Mfg. Co., New York, manufacturer of portable conveyors, buckets and bucket loaders, and division of Pettibone Mulliken Corp., Chicago.

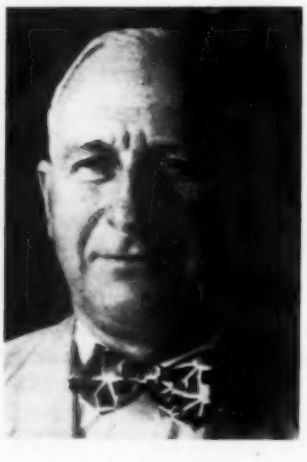
♦ ♦ ♦

Controllers Institute of America, New York, has announced election of new officers in sectional controls of the organization. **Frank V. Bigelow,** treasurer and controller, Malleable Iron Fittings Co., Branford, Conn., has been elected president of the Bridgeport, Conn., Control. **Ralph Knapp,** treasurer, Precision Castings Co., Syracuse, N. Y., has been named first vice president of the Syracuse

(*Continued on page* 102)

A. J. EDGAR

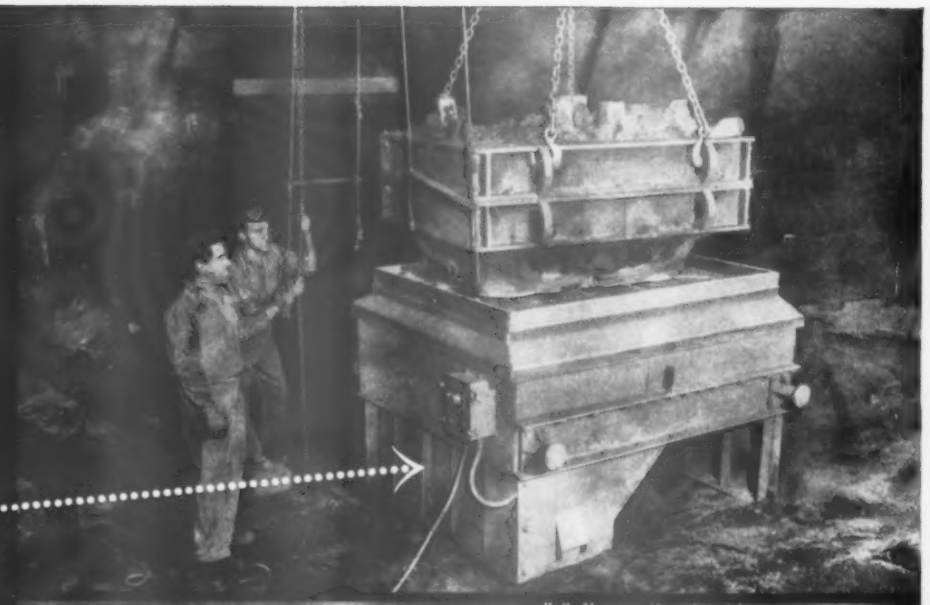
RICHARD H. BANCROFT



R. A. J. WELLINGTON

EDWARD R. COLE

Flask Shakeout



Core Knockout

...with one machine...as one operation!

Only the Robins Floatex Shakeout can perform these two foundry operations without removing the casting!

No wonder this Robins Floatex Shakeout is saving time . . . money . . . headaches.

First, it shakes out the 5800-lb. flask, containing a 2600-lb. casting with a 1200-lb. core. Time: 3 minutes.

Then, while the casting remains on the deck, it knocks out the core! Knockout time: 2 minutes.

No longer need the casting be taken to another point on the foundry floor, where men remove the core with sledges or mechanical hammers! The entire job is done as *one* operation with *one* machine.

Only the Robins Floatex Shakeout is powerful enough to knock out heavy cores as well as to shake out flasks—without damaging either! And only the Robins Floatex Shakeout is genuinely full-floating; it shakes the flask, not the foundry!

What is more, *only* the Floatex has a stroke adjustable to each shakeout or knockout requirement . . . from a unit as big as the hull of a General Sherman tank to one as small as a household valve.

Whether you want to do shakeout and knockout as a single operation or shakeout at night and knockout in daytime (when machine would otherwise be idle), write Robins.

Learn how both jobs can be done with *one* machine . . . by making only *one* investment.

ROBINS

FLOATEX SHAKEOUT

WRITE TODAY. Learn how you can save time, money and headaches by installing a Robins Floatex Shakeout. Made in portable and stationary types—with or without automatic, mechanical self-discharge feature. Address Robins Conveyors Division, 270 Passaic Avenue, Passaic, N. J.

ROBINS CONVEYORS DIVISION HEWITT-ROBINS INCORPORATED

Men OF INDUSTRY

(*Continued from page* 100)

Control, and **J. Glenn Bilyea,** controller of the same company, has been renamed a director. **Royal G. Parks,** controller, National Malleable & Steel Castings Co., Cleveland, is the new secretary of the Cleveland Control, and **C. Howard Paul,** treasurer, Mackintosh-Hemphill Co., Pittsburgh, has been named a director of the Pittsburgh Control.

♦ ♦ ♦

Willis G. Sullivan has been named executive vice president and general manager, Chas. A. Krause Milling Co., Milwaukee, producer of core binders for foundries, and other corn products. Mr. Sullivan has been engaged in the practice of law since he was graduated from University of Wisconsin in 1927. He has been legal counsel of the Krause company since 1931, a director for several years and was named secretary early this year.

♦ ♦ ♦

George W. Altman has been named plant manager of the Trenton, N. J., radiator foundry of the National Radiator Co., Johnstown, Pa., succeeding **E. W. Longacre** who has retired because of poor health. Mr. Altman, who joined the company earlier this year had previously been general manager of Bridgman Castings Inc., Bridgman, Mich., subsidiary of the Hannifin Corp., Chicago. Prior to that he was associated with the Lennox Furnace Co., Columbus, O., and Pittsburgh Coke & Iron Co., Pittsburgh. Mr. Longacre, who joined National Radiator Co. in 1914 as a patternmaker, subsequently became foundry and general superintendent of the Johnstown plant, general superintendent of the Trenton foundry and then general superintendent of all company plants. He became vice president and general manager of manufacturing in 1935, and a director in 1942. Failing health caused him to become inactive last year, but following several months of rest he assumed responsibility for the Trenton plant a year ago.

♦ ♦ ♦

Verne H. Schnee, until recently assistant director, Battelle Memorial Institute, Columbus, O., has been appointed director of the Research Institute, University of Oklahoma, Norman, Okla. Mr. Schnee was graduated from Cornell University, and joined the staff of the Battelle Memorial Institute in 1935. He has a wide experience in the application and development of inhibitors, lubricants and nonferrous alloys.

♦ ♦ ♦

Dr. L. P. Moore, since 1946 European technical representative, American Cyanamid Co., New York, has been appointed manager of the company's new products development department. Dr. Moore has been associated with the company for 12 years, first in the research laboratories in Stamford, Conn., and later in the New York executive offices. **Dr. E. W. Cook** succeeds Dr. Moore as European technical representative. After receiving degrees from University of Arkansas and Ohio State University, he joined American Cyanamid Co. in 1940. He also spent several years in the Stamford research laboratories and went to New York in 1946 as assistant chemical director.

♦ ♦ ♦

Graduates of the September class of the department of industrial engineering, Ohio State University, who have entered the foundry industry include the following: **Bruce Burkett** and **Eldon Boner** are now with Central Foundry Division, General Motors Corp., Defiance, O. **Edgar Sampson, Wilkerson Howard** and **Richard Riley** have become associated with the Ironton, O., plant, Dayton Malleable Iron Co., Dayton, O., and **Maurice Schenk** is with its G.H.R. Division, Dayton. **Charles W. Keith,** a June graduate, and a member of the university's student chapter of the AFS, has become a foundry instructor in the Lansing, Mich., public schools.

♦ ♦ ♦

John E. Morrison has been appointed district manager of the Duluth, Minn., district sales office, recently opened by Link-Belt Co., Chicago. Mr. Morrison, a graduate of the University of Minnesota, joined Link-Belt's Chicago plant in 1944 and early this year became sales engineer of the North-Central territory with headquarters in Minneapolis. **Harold A. Ivarson,** who has handled local sales in Minneapolis, will assist Mr. Morrison in Duluth.

♦ ♦ ♦

Charles E. Stevens Jr. has been appointed plant manager, Chicago Railway Equipment Co., Chicago. A graduate of Harvard Engineering School, Mr. Stevens has been associated with Fairchild Engine & Airplane Corp., New York, since 1941. In addition to other duties, he will direct development work on the Al-Fin metallic aluminum bonded to iron brake drums, pistons and other bimetallic products for Chicago Railway Equipment Co. and its subsidiaries. The parent company holds a license from Fairchild on the patented bonding process.

♦ ♦ ♦

S. J. Woodworth has been appointed sales manager, Wright Hoist Division, American Chain & Cable

(*Continued on page* 105)

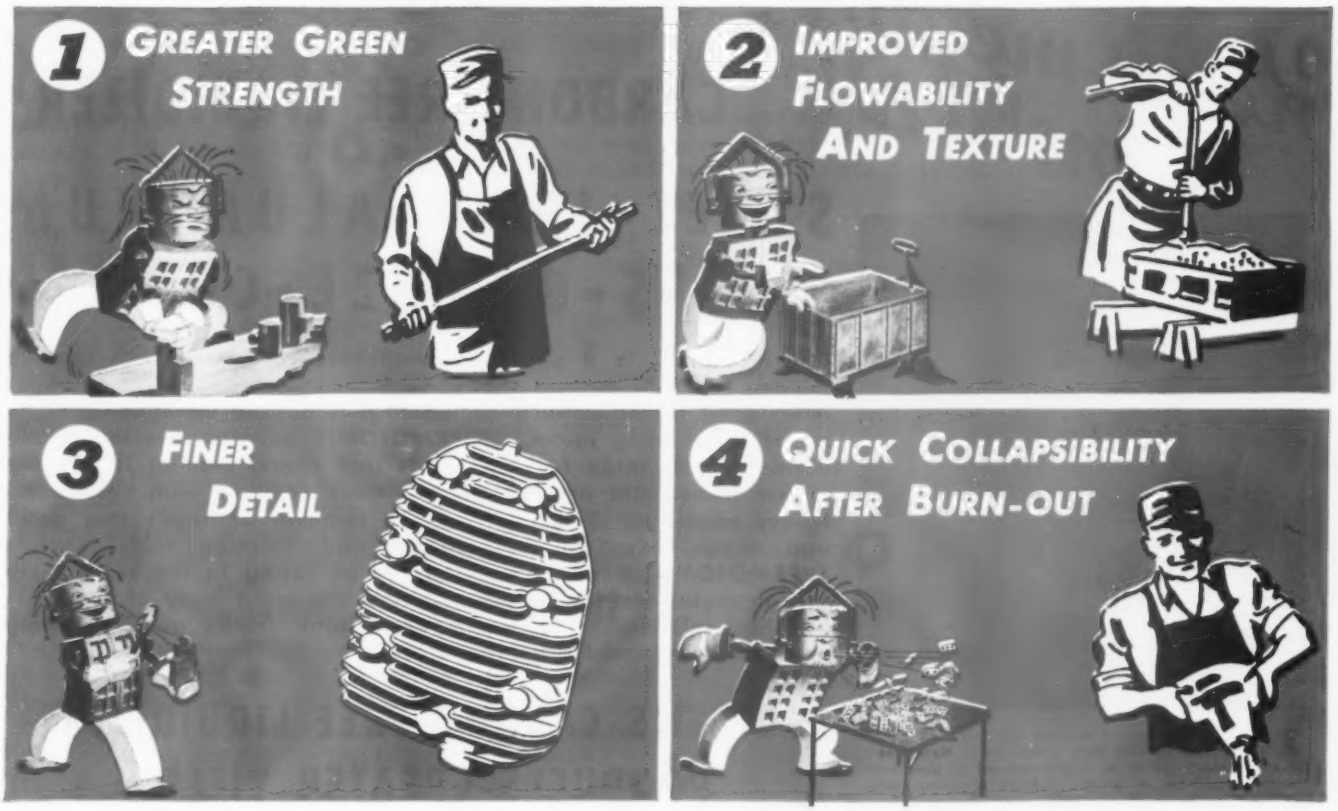
WILLIS G. SULLIVAN

E. W. LONGACRE

GEORGE W. ALTMAN

CORE TROUBLES?

4 WAYS TO GET BETTER RESULTS — USE KRAUSE CEREAL BINDERS



Yes — the qualities you need and want are yours in Krause's Cereal Binders—TRUSCOR (light weight) and AMERIKOR (heavy weight).

So why not take advantage of all these benefits by placing your next order with any of the distributors listed below or with us direct.

CHAS. A. KRAUSE MILLING CO., Milwaukee 1, Wisconsin

World's largest dry corn millers.

CEREAL BINDERS

DISTRIBUTORS

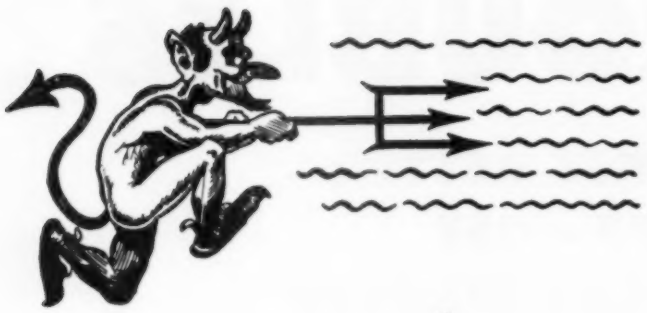
M. A. Bell Co.
Denver, Colo.
M. A. Bell Co.
Houston 2, Texas
M. A. Bell Co.
St. Louis 2, Mo.
A. L. Cavedo & Son, Inc.
Richmond 21, Va.

Foundry Supplies Co.,
Chicago 16, Ill.
J. H. Hatten & Son, Aldan,
Delaware Co., Pa.
J. B. Hayes Co.
Birmingham, Ala.
Independent Foundry Supply
Co., Los Angeles 11, Calif.

Marthens & Co., Moline, Ill.
Carl F. Miller & Co.
Seattle 4, Wash.
Milwaukee Chaplet & Mfg.
Co., Milwaukee 4, Wis.
Pacific Graphite Works
Oakland 8, Calif.

Porter-Warner
Chattanooga 2, Tenn.
Smith-Sharpe Co.
Minneapolis 14, Minn.
Frederic B. Stevens, Inc.
Buffalo 12, N. Y.
Frederic B. Stevens, Inc.
Cleveland 14, Ohio

Frederic B. Stevens, Inc.
Detroit 26, Mich.
Frederic B. Stevens, Inc.
New Haven 11, Conn.
Western Industrial Supply Co.
Portland 14, Ore.



Soffel's

THERMOTOMIC PROCESS

(Patented)

and

CARBON FREE LIQUIDIZER

For

STEEL • IRON • ALUMINUM BRASS • BRONZE • COPPER

Keeps metal molten!

300 lb. aluminum bronze bearing cap cast with THERMOTOMIC feeding ring core under riser. Note small feeder opening which facilitates removal of riser from casting, resulting in greatly reduced cleaning costs.

THERMOTOMIC is a patented Exothermic compound that can be molded into any desired shapes and used as feeding inserts under risers or as facing application where it is desired to maintain fluidity of the casting metal. THERMOTOMIC permits reversal of the trend towards large feeding heads and risers, making it possible to use heads that are shorter and more compact with very small feeder openings. This permits easy removal of heads and gates and sharp reductions in cleaning and finishing costs. When THERMOTOMIC is used as inserts or as facing in the mold, heat at thin metal sections is retained until the main body of the casting has solidified, thus eliminating shrink cracks and improving grain structure and tensile strength.

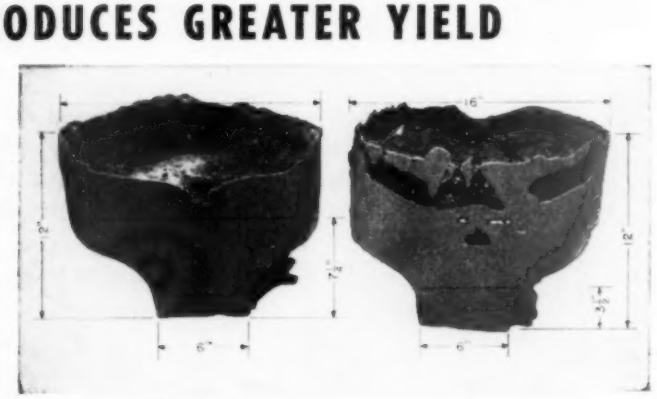
Thermotomic ABC for Aluminum and Magnesium Castings

THERMOTOMIC ABC is the first successful exothermic feeding compound ever to be developed for aluminum and magnesium castings. Results obtained from its use are amazing. Feeding metal in heads or risers is maintained in the fluid state for 20 to 30 minutes. Great savings are effected through reduced riser dimensions. Feeding heads or risers are reduced in volume 80% and more, and their removal from the casting is greatly facilitated due to the restricted feeding necks.

An Exothermic Feeding Head Compound and Pipe Eliminator For Aluminum and Magnesium Castings

SOFFEL'S AL-X31 LIQUIDIZER was developed for use in conjunction with THERMOTOMIC ABC. In order to secure best results and maximum feeding, we strongly recommend that AL-X31 LIQUIDIZER be applied on the feeding heads or risers. When so applied, AL-X31 LIQUIDIZER enters into an intense exothermic action which will actually raise the temperature of the feeding metal. The heat produced is sufficiently great that, even if the metal has solidified, it will re-melt. After AL-X31 LIQUIDIZER has completed its exothermic action, it forms a soft, insulating cover on the feeding metal. This cover confines the heat generated and further delays solidification of the feeding heads or risers.

SOFFEL'S CARBON FREE LIQUIDIZER PRODUCES GREATER YIELD



Steel Riser on left contains twice as much sound metal

These risers, made in the same mold, illustrate how Soffel's Carbon Free Liquidizer produces sounder castings and saves metal. The riser on the left, on which Carbon Free Liquidizer was used, contains more than twice as much sound metal as the riser on the right on which a common carbonaceous pipe eliminator was used. It is readily seen from this that the use of Soffel's Carbon Free Liquidizer permits substantial reductions in size of risers.

BEWARE OF IMITATIONS: We are the originators of Carbon Free Liquidizer.

PITTSBURGH METALS PURIFYING COMPANY

Manufacturers of Quality "Fluxes for all Metals and Alloys"

1352 Marvista Street **Pittsburgh 12, Pa.**

Men OF INDUSTRY

(*Continued from page* 102)

Co., Bridgeport, Conn., with headquarters in York, Pa. Mr. Woodworth succeeds **A. R. Haskins** who has resigned, following 25 years of service with the division, to establish his own business in Milwaukee.

♦ ♦ ♦

Philip T. Coffin has been named manager of pig and ingot sales, and manager of the warehousing division, Aluminum Co. of America, Pittsburgh, succeeding **Hugo T. Wilder** who recently became manager of the company's new marketing division. Mr. Coffin joined the company in 1926 as a cable salesman in the New York office. He served as works manager for the aluminum plant in Queens, N. Y., operated by the company for the government during the recent war, and became assistant manager of the New York district sales office in 1945.

♦ ♦ ♦

Ward A. Miller, vice president and director, Vanadium Corp. of America, New York, has been placed in charge of administering and co-ordinating the activities of the company's selling and technical divisions dealing with commercial affairs. **Gustav Laub,** until recently assistant vice president-general manager of sales, has been elected vice president in charge of sales.

♦ ♦ ♦

Charles E. Walker Jr., recently was elected vice president of the Dravo Corp., Pittsburgh. He will continue as secretary and director of industrial relations which positions he has held since September, 1944.

♦ ♦ ♦

General Refractories Co., Philadelphia, has made the following appointments: **Roger W. Braden,** formerly manager of the company's Detroit warehouse, has been named manager of its warehouse in New York; **DeWitt C. Clement Jr.** and **Alan R. Eakins** have been transfered from the estimating department to the New York warehouse as members of the warehouse sales force; **Richard H. Lightfine** has been transferred from that warehouse to the New York district sales office; **William C. Noble,** from the estimating department to the Philadelphia district sales office; **Karl E. Spaeth Jr.,** from the New York warehouse to the Pittsburgh district sales office and **Richard A. Stephens,** also formerly of the New York warehouse, has been transferred to the Philadelphia district office.

♦ ♦ ♦

Martin J. O'Brien Jr., until recently assistant works manager, Symington Gould Corp., Depew, N. Y., has been appointed works manager.

♦ ♦ ♦

John J. Jackson has been appointed superintendent of the foundry, Wright Aeronautical Corp., Wood-Ridge, N. J., which produces aluminum and magnesium alloy castings for the company's aircraft engines. Mr. Jackson succeeds the late Harry Lamker.

♦ ♦ ♦

Douglas C. Williams has been appointed associate professor in the industrial engineering department, Ohio State University. Mr. Williams has been an assistant professor engaged in instruction and research in foundry technology in the department since 1947. Prior to that he completed a fellowship sponsored by the American Foundrymen's Society, at Cornell University.

♦ ♦ ♦

John B. Hayes, of J. B. Hayes Co., Birmingham, has been appointed sales representative for the Electrode Division of Great Lakes Carbon Corp., Niagara Falls, N. Y., to handle sale of the company's products in North and South Carolina, Tennessee, Georgia, Florida, Alabama, Louisiana, Oklahoma and Texas. Prior to founding his own company in 1943, Mr. Hayes was associated for 16 years with Union Carbide & Carbon Co., New York.

♦ ♦ ♦

Hugh P. Gibbons has been appointed assistant superintendent, Hillsdale Foundry Co., Hillsdale, Mich. Mr. Gibbons was graduated from University of Michigan last June.

♦ ♦ ♦

J. A. Durr, who recently resigned as technical advisor to the general manager, Albion Malleable Iron Co., Albion, Mich., has joined the staff of the Erie Malleable Iron Co., Erie, Pa.

♦ ♦ ♦

John Mitchell, a recent graduate of the Missouri School of Mines and Metallurgy, Rolla, Mo., has accepted a position in the metallurgical department of the Key Co., East St. Louis, Ill.

♦ ♦ ♦

Merrill W. Manz, who has been associated with Ohio Brass Co., Mansfield, O., since 1920, has been elected vice president. **Roger A. Black** succeeds Mr. Manz as factory manager. **H. E. Shoemaker** is manager of the foreign trade department.

♦ ♦ ♦

Franklin P. Goettman, until recently research manager, George F. Pettinos Inc., Philadelphia, has been appointed sand foreman, Duriron Co., Dayton, O. A graduate of Pennsylvania State College, Mr. Goettman is

(*Concluded on page* 108)

PHILIP T. COFFIN

WARD A. MILLER

GUSTAV LAUB

WHEELABRATOR®

48" x 42" TUMBLAST

HOW THE WHEELABRATOR CUTS COSTS AT THIS PROMINENT PLANT

	FORMER METHOD	WHEELABRATOR METHOD	SAVINGS
MACHINE	9 tumbling mills	48" x 42" Wheelabrator Tumblast (17½ cu. ft. capacity)	per ton $2.08
PRODUCTION	16 tons daily	17 tons daily	per day $35.36
LABOR REQUIREMENTS	5 men at 9 hours each — 45 man hours	2 men at 8 hours each — 16 man hours	per month . $746.72
CLEANING COST	$3.95 per ton	$1.87 per ton	per year .$8,960.64

saves $8,960.64 a year

for the LENNOX FURNACE CO.

Marshalltown Foundry Div.
Marshalltown, Iowa

REDUCES CLEANING COSTS 53%

AFTER PAYING FOR ITSELF IN THE FIRST YEAR OF OPERATION, the Wheelabrator Tumblast is paying a daily bonus of $35.36 to the Marshalltown Foundry Div. of Lennox Furnace Co. Each day it is saving 29 man hours. Two men clean 17 tons of furnace castings in 16 man hours where 5 men previously worked a total of 45 man hours to clean 16 tons.

One Wheelabrator Tumblast replaced 9 tumbling mills and eliminated the noise and dirt which formerly attended the operation in the mill room. In 15 to 20 minutes, the Tumblast cleans a quantity of work that required an hour and three-quarters in a mill.

Carl Cordt, Foundry Superintendent, sums up the advantages of the Wheelabrator as follows: "It is so much cleaner, so free from noise as compared with the old method, and so much more efficient in the manner in which it cleans the castings that I am surprised now how we ever got along without it."

BEFORE WHEELABRATING

AFTER WHEELABRATING

WHEELABRATING COSTS YOU LESS

A Wheelabrator cleans faster for less cost because it throws more abrasive per horsepower expended. All surfaces of the work are exposed so that even the most intricate parts are thoroughly cleaned. You can compare Wheelabrator Cleaning with your present methods without cost to you. Just send us samples of the work you are cleaning. We will make a test run in our laboratory and give you detailed performance data.

New, informative book gives complete, concise information on all phases of airless blast cleaning. Write today for Catalog No. 74-A.

American

WHEELABRATOR & EQUIPMENT CORP.
505 S. Byrkit St., Mishawaka 2, Indiana

WORLD'S LARGEST BUILDERS OF AIRLESS BLAST EQUIPMENT

Men OF INDUSTRY

(*Concluded from page* 105)

active in committee work of the Sand Division of the American Foundrymen's Society.

♦ ♦ ♦

Robert W. Clyne has been appointed manager of the passenger, locomotive and industrial department, Railway Sales Division, American Steel Foundries, Chicago. Mr. Clyne, who joined the company in 1930, has served as sales assistant, sales agent, war production engineer, and since 1946 has been assistant vice president. Mr. Clyne succeeds **Armand H. Peycke,** who has retired following 37 years of service. Mr. Peycke will continue to be available in a consulting capacity and for special assignments.

♦ ♦ ♦

L. F. A. Mitchell has been appointed sales manager, Sperry Products Inc., Danbury, Conn., in charge of sales of nondestructive testing services and equipment. Mr. Mitchell was formerly manager of headquarters sales, Crocker-Wheeler Electric Mfg. Co., and prior to that was associated with Westinghouse Electric Corp., East Pittsburgh, Pa., and Canadian Westinghouse Co. Ltd.

♦ ♦ ♦

Joseph A. Shuffstall, assistant plant manager of the National Erie Corp., Erie, Pa., is the present chairman of the Northwestern Pennsylvania Chapter of the AFS. Born in Franklin, Pa., Mr. Shuffstall attended the public schools in Canton, O., and Erie. In addition to completing a draftman's course, Mr. Shuffstall has studied both mechanical engineering and metallurgy through extension courses of Pennsylvania State College. Mr. Shuffstall's entire career has been with the National Erie Corp., joining that organization as an apprentice patternmaker in 1923 and becoming a patternmaker in 1927. Three years later he was made pattern foreman and in 1934 became chief inspector. He served one year as foundry estimator in 1937, and next became production manager. Mr. Shuffstall has held his present position as assistant plant manager since 1939.

♦ ♦ ♦

Robert Spurgin III, formerly superintendent of foundries, Swayne, Robinson & Co., Richmond, Ind., has been appointed director of the firm's development engineering and methods department.

♦ ♦ ♦

E. C. Meagher has been appointed Milwaukee representative of the Federal Foundry Supply Co., Cleveland. Mr. Meagher, who has been engaged in the sale of refractory products in the Milwaukee area for about 11 years, will have his headquarters in the company's office there at 647 West Virginia St.

♦ ♦ ♦

Anthony Derrick, formerly assistant superintendent of the Mahwah, N. J. plant, American Brake Shoe Co., New York, has been appointed superintendent there. Mr. Derrick, who has studied metallurgy at Lewis Institute and Armour Institute of Technology, Chicago, joined American Brake Shoe Co. in 1925.

♦ ♦ ♦

Dr. Nicol H. Smith has been appointed director of research operations of Franklin Institute Laboratories for Research and Development, Philadelphia. Dr. Smith was placed in charge of research work undertaken by Franklin Institute for the federal government early in World War II and with the organization of the Franklin laboratories in 1946 was appointed director of the division of chemical engineering and physics. Other laboratories appointments include **Ralph H. McClarren** and **Frank S. Chaplin** as associate directors, **Harry H. Stout Jr.,** assistant director for contract administration and **Peter F. Suffredini,** manager of administrative services.

♦ ♦ ♦

E. W. Chapman has been named assistant sales manager, and **S. N. Morison,** manager of industrial sales, S. G. Taylor Chain Co., Hammond, Ind.

♦ ♦ ♦

Richard A. Larson, formerly foundry metallurgist and sand technician at the Beloit, Wis., works of Fairbanks, Morse & Co., Chicago, has joined the sales engineering staff of the Foundry Supply Co., Minneapolis. Mr. Larson will handle sales of refractories and foundry sands and binders in Minnesota and Iowa.

♦ ♦ ♦

Edward W. Bowman has been appointed engineer in the arch and wall sales division, Laclede-Christy Co., St. Louis, with headquarters in the general sales office, Pittsburgh. Mr. Bowman, who received a degree in mechanical engineering from University of Toledo, has had more than eight years' experience in industrial furnace design and construction.

♦ ♦ ♦

Col. R. H. Elder, who since his return from three years of service with the Chemical Corps during the war, has served as staff writer for the American Cast Iron Pipe Co., Birmingham, recently returned to his former position as chief chemist for the company. **Roy E. Deas,** who has been serving as acting chief chemist, has been appointed chief analyst.

ROBERT W. CLYNE

L. F. A. MITCHELL

JOSEPH A. SHUFFSTALL

Sixth in a series of Unusual Grinding Wheel Operations

GRINDING WHEEL MEETS COCOA BEAN!

● The delicious chocolate flavor of Hershey's and other brands of chocolate, starts with the *grinding* of the dried cocoa beans. Pulverizing the bean by grinding, rather than by any other process, retains the original flavor.

Whatever YOUR grinding problem may be, BAY STATE can solve it . . . fast. Possibly the exact specifications to meet your requirements can be supplied directly from large stocks either in Westboro, branch warehouses, or from our distributors strategically located throughout the United States.

Send us your grinding problems. We can help you.

These mills, using fine, hard grinding wheels convert the dried cocoa beans into rich chocolate liquor. Courtesy of Hershey Chocolate Corporation

BAY STATE ABRASIVE PRODUCTS CO.
Westboro, Massachusetts, U. S. A.

Branch Offices and Warehouses — Chicago, Cleveland, Detroit, Pittsburgh.
Distributors — All principal Cities.

BAY STATE®

MEMBER OF THE GRINDING WHEEL INSTITUTE

Top Performance Consistently Duplicated

FOUNDATION ADVISORY COMMITTEES

Play Increasingly Important Role

REVIEW of activities of the Foundry Educational Foundation during the relatively short period of its operations indicates the important role played by its advisory committees in the progress achieved to date.

It was originally planned to set up industry committees at each Foundation school to provide industry-university co-operation in working out the foundry educational program. This early contact with the universities not only proved highly beneficial, but also indicated the desirability of proceeding along similar lines in furthering the co-operation between industry and the schools. Consequently, in addition to the Industry Advisory Committees, a Technical Advisory Committee was created, and a little later the University Advisory Committee was formed. Activities of each group blend into those of the others. Findings of the committees are applied voluntarily, involving no compulsion, and beneficial results so far are said to have been considerably more than were anticipated.

Technical Advisory Committee—Each major group in the castings industry is included in this overall committee. C. W. Briggs represents the Steel Founders' Society of America, James H. Lansing the Malleable Founders' Society, A. W. Gregg the Foundry Equipment Manufacturers Association, Walter W. Edens the Non-Ferrous Founders' Society, Everett G. Fahlman the Aluminum Foundry Division of the Aluminum Association and Sil C. Massari the American Foundrymen's Society. George Johnstone Jr. acted for the Gray Iron Founders' Society prior to the retaining of Charles O. Burgess who now actively represents that group. All of these men are appointed for the term of the Foundry Educational Foundation by its president.

This committee has become one of the main avenues of recommended technical procedure and source material to the universities. It also suggests methods to the industry to further the use and ability of engineering graduates within foundry organizations.

This committee meets annually to review developments of the past year, consider refinements of present recommendations and to make new suggestions. In addition, many items which would help present the industry to the university in a better light (and in turn the university to foundrymen) are considered.

Meetings are usually held in conjunction with the University Advisory Committee. Subjects of recent discussion include improved definition of "Engineering Management" and how it applies to the foundry; the promotion of and problems connected with recruiting and training engineering graduates; student registration and contact procedure as practiced by the FEF; summer work for students; recommendations as to progress and use of engineering graduates and their value to the industry; definition and distinctions between trade and engineering education as applied to the foundry; proposed student handbook; technical accuracy as applied to the foundry process; casting design and use data; current technical developments in the foundry; association activities in the universities; research possibilities in university laboratories; and the problem of providing qualified instructors for secondary schools, colleges, universities, etc.

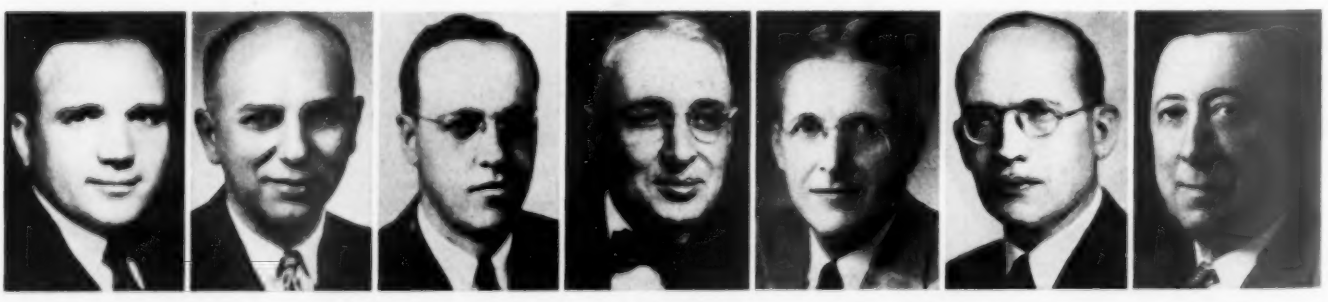
University Advisory Committee—The Foundation's policy strongly acknowledges the fact that educational methods and procedures are best handled by educators and that final decisions in this field must rest with those authorities. The help and advice of these men has been constantly sought and is reflected in the policies and methods the FEF follows.

This committee is composed of the key men in the foundry program at each of the Foundation universities. In the expanded program this will include Howard F. Taylor of M.I.T., Peter E. Kyle of Cornell, K. H. Donaldson of Case, Douglas Williams of Ohio State, C. E. Bullinger of Penn State, J. F. Kahles of Cincinnati, C. T. Marek of Purdue, D. S. Eppelsheimer of Missouri School of Mines, R. H. Cole of Northwestern, G. J. Barker of Wisconsin, C. C. Sigerfoos of Michigan State and E. C. Wright of Alabama.

These men, meeting with the Technical Advisory Committee, establish a direct liaison with the various industry branches. This, in turn, permits a free flow of information and assistance in both directions, and many worthwhile recommendations have stemmed from this university group. It is expected that progress in this gradual development of a true engineering type of foundry lecture and laboratory courses in the respective universities will provide useable information that can form a preliminary recommendation to other educators at the university level this coming year. The continuous refinement and development of foundry engineering courses will bear fruit in

(*Concluded on page* 112)

Technical Advisory Committee—



C. W. BRIGGS | S. C. MASSARI | W. W. EDENS | A. W. GREGG | J. H. LANSING | C. O. BURGESS | E. G. FAHLMAN

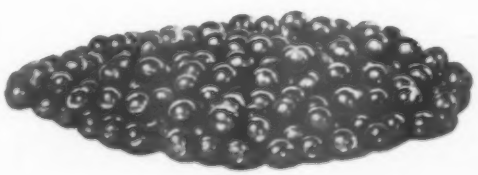
There's also an "extra something" in ANNEALSHOT

Yes, just as certain personalities stand out from others, ANNEALSHOT has that "extra something" that other shot does not possess.

ANNEALSHOT is formed on special equipment to assure more uniform roundness, then annealed by an exclusive process that toughens and hardens it. That's why ANNEALSHOT gives a better finish, lasts longer and is easier on equipment.

If you haven't already changed over to ANNEALSHOT, as so many leading foundries have, send for that trial order . . . TODAY.

METAL BLAST INC.
872 E. 67th St. Cleveland 3, O.



ANNEALSHOT by Metal Blast

Trade Mark Reg. U. S. Pat. Off.

University Advisory Committee—

H. F. TAYLOR E. C. WRIGHT R. H. COLE G. J. BARKER J. F. KAHLES K. H. DONALDSON P. E. KYLE

(*Concluded from page* 110)

the next five years with more adequately prepared young men capable of applying engineering principles to foundry operations.

Members of this committee are assisted further by the contacts which they and their associates have with Industry Advisory Committees in each Foundry Educational Foundation university.

Industry Advisory Committee—Direct co-operation with the industry within the area of any FEF university is smoothed by the presence of an Industry Advisory Committee appointed by the Foundation president to serve a particular university.

This committee is the real representative of the foundry industry to the university. Universities will resist pressure groups, self-seeking individual companies and others who try to dictate the conduct of their institution. However, they do welcome the suggestions and co-operation of broad industry groups. Such groups also provide the incentive and backing within the university which enables the immediately interested staff to obtain facilities and course arrangement to prepare a desirable graduate.

Continuous representation of the industry in the form of advisory committees will thus insure the growth of present facilities. These facilities not only benefit the industry through more thoroughly prepared graduates, but serve to interest all student engineers in the ability of the foundry industry. Thus, at the same time, a second objective of the Foundation is achieved.

Specific activities of each committee include assistance in arranging plant visits, sample castings for laboratory analysis and display, casting exhibits, lending or giving pattern equipment for student use, lending models and equipment. At Northwestern and the University of Cincinnati the committees have conducted meetings for high school students interested in college careers and especially the foundry industry.

Meetings are usually held once or twice a year at which the university staff presents a summary of progress and development during the intervening months. Discussions and inspection of facilities help to give full acquaintance with the university. Committee members thus are in a position to pass on to the foundry industry some knowledge of the activity in each school and thereby help represent the university to the industry.

As the FEF continues its progress these committees are expected to become increasingly important. The moral support of a well represented industry is both encouraging to as well as productive of better results from a university staff. For the first time the universities of the land are in co-operative touch with an entire industry on a national basis.

Membership of these committees and the universities they serve are as follows:

Case Institute of Technology—Walter L. Seelbach, chairman, Charles A. Barnett, F. H. Wellman, B. H. Scott, Dr. B. E. Warden, Merrill W. Manz, Frank G. Steinebach, D. B. Hanna, George E. Miller, William B. Crawford.

Northwestern Technological Institute—Leon J. Wise, chairman, H. Bornstein, George W. Cannon, A. W. Gregg, L. C. Osborne, E. H. Reed, Bruce L. Simpson, Stowell Wasson.

Massachusetts Institute of Technology—Howard A. Stockwell, chairman, G. J. Behrendt, Augustus Harrington, George F. Hutchins II, Walter M. Saunders Jr.

Cornell University—Richard W. Crannell, chairman, William C. Baird, Grant S. Diamond, Hamilton Garnsey Jr., Lawrence C. Gleason, Robert Minnear, Ralph T. Rycroft.

University of Cincinnati—Raymond J. Redmond, chairman, Herman Ewig, Frank S. O'Neil, George H. Tompkins.

University of Wisconsin—R. J. Anderson, chairman, W. R. Tanner, J. A. Gitzen, R. H. Weaver.

University of Alabama—James T. MacKenzie, chairman, S. D. Moxley, L. N. Shannon, Gordon P. Street.

Similar committees will be appointed at each of the five additional engineering schools being contemplated for the second three-year FEF program. These are Pennsylvania State College, Michigan State College, Ohio State University, Missouri School of Mines and Metallurgy and Purdue University.

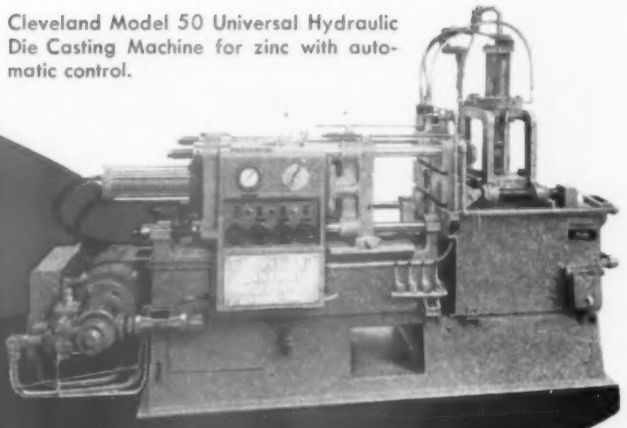
Chairmen, Industry Advisory Committees—

L. J. WISE R. W. CRANNELL J. T. MacKENZIE R. J. ANDERSON R. J. REDMOND W. L. SEELBACH H. A. STOCKWELL

CLEVELAND
presents with Pride

The New,

SMALL SIZE, LOW COST
Model 50 DIE CASTING MACHINE!



Cleveland Model 50 Universal Hydraulic Die Casting Machine for zinc with automatic control.

Here is great news in die casting! Cleveland now makes available to *all* industry a rugged, small size, high production die casting machine that is priced *surprisingly low!*

Cleveland's time-proved leadership in die casting machine design has created in the new Model 50 a *fast . . . flexible . . . accessible . . . dependable* machine. It will produce dense, hardware finish castings at a very rapid rate.

Ease, convenience and safety of operation have been stressed in the Model 50 design. Construction is similar in many details to the widely used, large Model 400 Cleveland. The bed, tie bars, toggles, links, pins, platens, etc., are of heavy, rigid construction. Plenty of die handling space has been provided. A tote pan can be inserted in the bed to receive automatically ejected small parts. Either manual or automatic-timed controls can be supplied. The Model 50 converts from zinc to aluminum casting by simply changing hot metal ends.

Let a Cleveland Sales Engineer show you how this new Cleveland development can increase your production with *money saved!* A few Model 50 specifications are listed below. Write now for *complete* information.

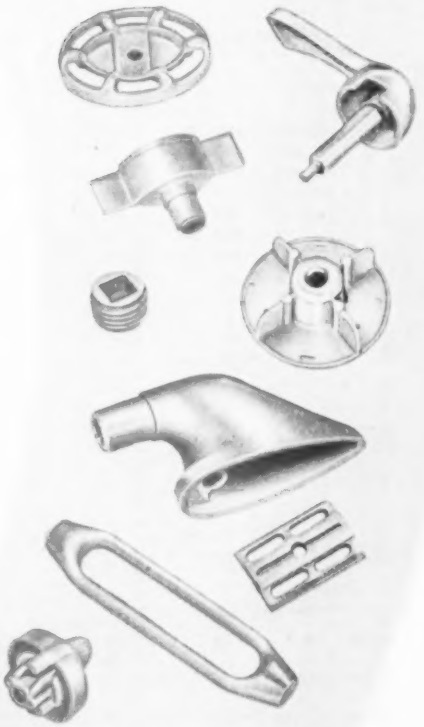
Die Plates	22" x 18"	Die space	4" to 15"
Tie Bar diam.	2"	Die opening	8"
Locking pressure	50 tons	Floor space	52" x 116"

Weight of Zinc per shot—up to 4 lbs.

Weight of Aluminum per shot—up to 2.57 lbs.

Remember, *Clevelands Cut Costs—*

Get Fast Production on Zinc and Aluminum Parts like these with the new MODEL 50 CLEVELAND



FREE CYCLE TIME

1000+Shots Per Hour!

Actual production rate dependent upon casting size and complexity.

4926 Beech Street
Cincinnati 12, Ohio

SALES OFFICES: CHICAGO
CLEVELAND • DETROIT
HARTFORD • NEWARK

THE CLEVELAND AUTOMATIC MACHINE COMPANY

Manufacturers of a Complete Line of Single Spindle Automatic Screw Machines and High Pressure Hydraulic Die Casting Machines

FOUNDRY Statistics

Ingot Brass and Bronze

(Shipments in net tons)

	1949	1948
Jan.	19,456	26,998
Feb.	15,026	22,487
Mar.	14,550	24,282
Apr.	10,695	25,177
May	11,114	23,716
June	9,696	24,401
July	10,220	20,456
Aug.	14,194	24,098

Source: Ingot Brass and Bronze Industry.

Foundry Production Workers

ESTIMATED NUMBER:

Type Foundry	May 1949	Apr. 1949	May 1948
Gray Iron	88,000	95,100	112,900
Malleable Iron	30,400	31,100	37,300
Steel	61,100	65,400	72,100
AVERAGE WEEKLY EARNINGS:			
Gray Iron	$50.80	$51.43	$55.15
Malleable Iron	49.52	51.34	57.21
Steel	57.03	57.86	60.49
AVERAGE WEEKLY HOURS:			
Gray Iron	34.8	35.2	39.3
Malleable Iron	33.7	34.5	40.4
Steel	37.5	37.7	41.3

LABOR TURNOVER RATE (MAY)

(Per 100 employees)

	Total Accession	Total Separation	Quit	Layoff
Gray Iron	2.9	7.0	1.5	4.9
Malleable Iron	2.3	5.6	1.2	4.0
Steel	1.6	6.6	1.0	5.3

Source: Bureau of Labor Statistics.

Index of Foundry Equipment Orders

Foundry Trades Only

(Net Orders Closed, New Equipment)

	1948	1949
Jan.	380.9	149.9
Feb.	367.3	144.4
Mar.	326.2	190.8
Apr.	412.0	172.0
May	388.5	121.9
June	376.8	164.9
July	456.3	146.6
Aug.	324.7	127.1
Sept.	273.5	....
Oct.	296.0	....
Nov.	284.4	....
Dec.	243.7	....

Note: Figures are percentages of the base period 1937-1939 taken as 100 per cent (monthly average). Source: Foundry Equipment Manufacturers Association.

Shipments of Castings

(Reported by Bureau of the Census)

Gray Iron

(Net tons)

	Shipments Total	Shipments For Sale	Unfilled *Orders
1947			
Total	12,540,960	7,181,299	.....
1948			
May	992,692	555,728	2,601,626
June	1,072,040	597,624	2,587,081
July	914,464	490,359	2,601,084
Aug.	1,050,948	597,678	2,598,789
Sept.	1,088,051	615,978	2,587,385
Oct.	1,148,422	642,485	2,522,831
Nov.	1,099,827	606,380	2,406,737
Dec.	1,110,512	624,739	2,284,348
Total	12,785,909	7,131,405	.....
1949			
Jan.	1,040,343	573,164	2,064,861
Feb.	986,591	535,163	1,857,403
Mar.	1,074,704	567,041	1,639,465
Apr.	929,307	467,433	1,445,532
May	866,631	439,420	1,243,266
June	905,573	455,442	1,086,989
July	696,915	341,657	1,031,963

Steel

(Net tons)

	Shipments Total	Shipments For Sale	Unfilled *Orders
1947			
Total	1,625,055	1,203,504	.....
1948			
May	143,337	111,616	482,531
June	152,894	117,794	469,973
July	120,445	87,927	497,410
Aug.	140,223	107,538	472,481
Sept.	149,222	112,551	447,972
Oct.	152,983	114,819	424,460
Nov.	146,835	110,275	395,013
Dec.	157,395	116,285	354,458
Total	1,760,032	1,335,295	.....
1949			
Jan.	140,577	103,503	338,889
Feb.	135,042	99,425	320,202
Mar.	138,889	102,027	284,754
Apr.	119,953	83,277	250,506
May	106,178	75,537	191,473
June	116,052	84,112	173,237
July	78,710	50,124	155,494

Malleable

(Net tons)

	Shipments Total	Shipments For Sale	Unfilled *Orders
1947			
Total	895,054	513,228	.....
1948			
May	76,078	42,338	191,553
June	81,747	48,170	178,760
July	64,995	35,018	180,421
Aug.	73,272	41,201	176,824
Sept.	77,815	43,985	164,002
Oct.	81,761	44,305	158,351
Nov.	77,194	42,241	146,422
Dec.	79,882	43,397	137,385
Total	933,265	525,212	.....
1949			
Jan.	71,876	38,040	126,393
Feb.	66,744	35,074	118,318
Mar.	72,052	38,143	102,379
Apr.	61,329	31,728	94,958
May	54,572	27,643	78,944
June	59,597	32,639	69,865
July	44,360	23,216	70,796

Aluminum

(Thousands of pounds)

	Shipments Total	Sand	Perm. Mold	Die	Unfilled *Orders
1947					
Total	441,996	155,112	174,515	110,538	.....
1948					
May	33,868	11,854	12,351	9,383	75,219
June	35,822	12,296	13,239	9,843	72,930
July	28,944	9,851	10,504	8,005	70,321
Aug.	32,136	9,883	13,174	8,526	68,334
Sept.	35,877	11,822	13,353	10,218	66,773
Oct.	35,542	11,733	13,216	10,158	65,538
Nov.	34,550	11,410	13,012	9,640	63,767
Dec.	31,836	10,335	11,589	9,290	59,154
Total	424,490	139,781	161,334	118,738	.....
1949					
Jan.	29,142	9,702	10,386	8,490	55,580
Feb.	27,228	9,286	9,339	7,795	52,916
Mar.	27,478	9,348	9,386	7,999	50,508
Apr.	23,801	8,041	8,353	6,876	45,638
May	21,392	7,582	7,293	5,994	41,460
June	23,261	8,668	7,790	6,257	38,159
July	18,621	6,311	6,592	5,180	36,993

Magnesium

(Thousands of pounds)

	Shipments Total	Shipments For Sale	Unfilled *Orders
1947			
Total	7,693	7,050	....
1948			
May	622	542	2,673
June	709	624	2,712
July	554	521	2,684
Aug.	703	655	2,834
Sept.	745	700	3,206
Oct.	708	650	3,070
Nov.	728	683	3,416
Dec.	754	695	3,455
Total	8,214	7,488	....
1949			
Jan.	822	761	3,821
Feb.	813	756	3,586
Mar.	879	800	3,227
Apr.	726	669	3,234
May	778	726	2,885
June	799	759	3,025
July	689	637	3,073

Copper-base Alloys

(Thousands of pounds)

	Shipments Total	Sand	Perm. Mold	Unfilled *Orders
1947				
Total	1,051,742	960,732	51,139	.....
1948				
May	81,286	72,982	4,910	65,818
June	84,817	76,241	5,148	64,149
July	71,803	64,389	4,670	66,014
Aug.	81,976	73,947	5,018	69,126
Sept.	86,973	78,830	4,999	66,574
Oct.	91,311	82,463	5,293	62,571
Nov.	86,497	77,751	5,107	60,892
Dec.	88,182	79,750	4,796	53,671
Total	1,030,825	930,790	59,009	.....
1949				
Jan.	76,348	68,379	4,593	48,124
Feb.	68,776	61,278	3,951	40,517
Mar.	70,173	62,557	3,927	37,646
Apr.	59,573	52,837	3,458	32,746
May	53,699	48,004	2,830	30,926
June	52,616	47,678	2,552	26,786
July	43,273	39,372	2,129	26,013

* For sale only.

Proposed Revised Tentative Methods of

PREPARATION OF MICROGRAPHS OF METALS AND ALLOYS

INCLUDING RECOMMENDED PRACTICE FOR PHOTOGRAPHY AS APPLIED TO METALLOGRAPHY

ASTM Designation: E2— -49T

Scope

1. These methods establish a routine to follow in the examination and photography of ferrous and nonferrous metals and alloys with the light microscope. They include standard methods of procedure for securing standard magnifications and rules to be followed in making micrographs of metallurgical specimens.

Standard Magnifications

2. The standard magnifications for general use in making micrographs, expressed in diameters, shall be as follows:

25×	100×	250×	1000×
50×	150×	500×	1500×
75×	200×	750×	2000×

Magnifications of 1×, 5× and 10× may be used where convenient.

Reproduction of Micrographs

3. (a) Reproductions of micrographs shall be made at standard magnifications except in those special cases where special details of the structure are to be illustrated.

(b) If micrographs submitted for publication are not of standard magnification, they shall be enlarged or reduced to the nearest standard size. The actual magnification appearing in print shall be stated under the micrograph (see Paragraph (d)).

(c) With each micrograph shall be printed an explanatory title, together with the actual magnification, etching medium, treatment, etc., indicating what the illustration is intended to show, so that it will not be necessary to search the text for general information. With micrographs at magnifications of approximately 500× and above, the numerical aperture of the objective and the type of illumination shall be given.

(d) Micrographs in which the magnification is less than 30× are usually made with photographic lenses.

Lenses

4. For obtaining the magnifications recommended, the following types of lenses are suggested as suitable for general commercial work:

(a) For Magnifications up to 30×.—A photographic objective, designed for making enlargements (an anastigmatic photographic objective used reversed in its mount may serve), of focal length from 30 to 80 mm., used without an ocular.

(b) For Magnifications from 30× to 75×.—A 32-mm. microscope objective with Huygens type ocular (approximately 5×).

(c) For Magnifications from 75× to 150×.—A 16 to 25-mm. microscope objective with Huygens type ocular (approximately 5×).

(d) For Magnifications from 150× to 400×.—An 8 to 11 mm. microscope objective with Huygens type ocular (approximately 5×).

(e) For Magnifications from 400× to 750×.—A 4 to 6-mm. microscope objective, or a microscope objective having at least 0.65 N.A. with properly compensated ocular (approximately 5×) or amplifier.[1]

(f) For Magnifications from 750× and Higher.—An oil immersion microscope objective (preferably apochromatic) having at least 1.25 N.A. with properly compensated ocular (approximately 7.5×) or amplifier.[1]

Directions for Use of Lens Combinations

5. (a) All objectives shall be corrected for use without cover glasses.

(b) In using any of the lens combinations given in Section 4, the length of the camera bellows may be adjusted to give the exact magnification desired.

(c) The magnification shall be determined by accurately measuring the image of a stage micrometer scale, and not by estimation from lens combinations, or microscope or camera adjustments.

RECOMMENDED PRACTICE FOR PHOTOGRAPHY AS APPLIED TO METALLOGRAPHY

6. The subject of photography as applied in metallography can be conveniently divided into the following:

Magnifications
Lenses
Illumination of Specimens
Photographic Materials

Magnifications

7. The magnifications of micrographs should be those listed in Section 2.

Lenses

8. In Table I have been grouped the various lenses and combinations of lenses, which will be found convenient for obtaining different magnifications. Lenses are coated with a thin layer, approximately ¼ wave length in thickness, of low refracting material, such as cryolite or magnesium fluoride, in order to reduce the percentage of light reflected from the air-glass surfaces. These coatings are referred to as antireflection or low-reflecting films

[1] An amplifier is a negative lens combination and can only be used for projection of an image on a screen.

Proposed Revised Tentative Methods of

PREPARATION OF MICROGRAPHS OF METALS AND ALLOYS

INCLUDING RECOMMENDED PRACTICE FOR PHOTOGRAPHY AS APPLIED TO METALLOGRAPHY

ASTM Designation: E2— -49T

and, when applied to metallographic objectives, a gain in image contrast results. The amount of this gain depends not only on the objective design, but also on the type of specimen being observed. A definite and useful gain in contrast is obtained on specimens having low reflecting power and low contrast. Little gain in contrast is obtained on contrasty specimens of high reflecting power having few shades of gray. Together with the increase in contrast, the low reflecting films cause an increase in light transmission.

Illumination of Specimens

9. (a) With objectives of the photographic type when used to give 30× or less linear magnification (first 4 lenses of Table I), vertical illumination is obtained by inserting the illuminator (plane glass) between the lens and the surface of the specimen. This form of illumination will allow the projection of a field slightly smaller in diameter than the diameter of the photographic lens unless special precautions are taken. A condenser lens of large diameter must be placed as close as possible to the plane glass reflector and its focal length must be such that an image of the light source will be projected into the aperture of the photographic lens. The light passes from condenser to photographic lens by reflection at the plane glass reflector and again at the surface of the specimen. The optimum size of field which can be projected on the plate of the camera is equal to one half the diameter of the condenser. This optimum cannot be secured because of lens thickness and mounting requirements (see Fig. 1).

TABLE I.—Lenses Recommended For Maximum Resolution At Various Magnifications.

Linear Magnification	Objective: Type	Objective: Focal Length (Approximate)	Ocular
1 to 3 ...	photographic	6 in.	none
3 to 10 ...	photographic	72 mm.	none
10 to 20 ...	photographic	40 mm.	none
20 to 30 ...	photographic	32 mm.	none
	MICROSCOPE		
25	achromatic	48 or 32 mm.	Huygens type
50	achromatic	32 mm.	Huygens type
75	achromatic	25 mm.	Huygens type
100	achromatic	25 or 16 mm.	Huygens type
150	achromatic	16 mm.	Huygens type
200	achromatic	10 or 8 mm.	Huygens type
250	achromatic or apochromatic	8 mm.	compensating or amplifier
500	achromatic or apochromatic	4 or 6 mm.	compensating or amplifier
750	achromatic or apochromatic	4 mm. or oil immersion	compensating or amplifier
1000	apochromatic preferred	oil immersion	compensating or amplifier
1500	apochromatic preferred	oil immersion	compensating or amplifier
2000	apochromatic preferred	oil immersion	compensating or amplifier

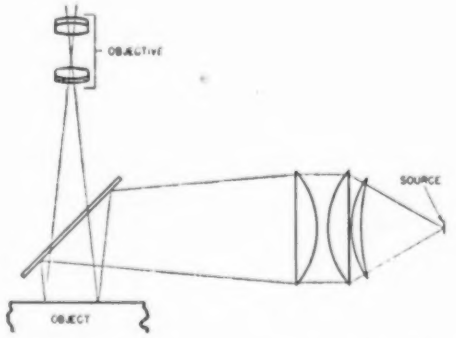


Fig. 1 — Vertical illumination

(b) With objectives of the photographic type, when used to give 30× or less linear magnification, oblique illumination is obtained by directing a substantially parallel beam of light so that it strikes the surface of the specimen obliquely. The degree of inclination the light beam makes with the normal to the specimen is subject to variation. A relatively smooth surface requires a smaller angle of inclination than a rough surface. If the surface is too smooth, only a very narrow region of the specimen will be evenly illuminated (see Fig. 2).

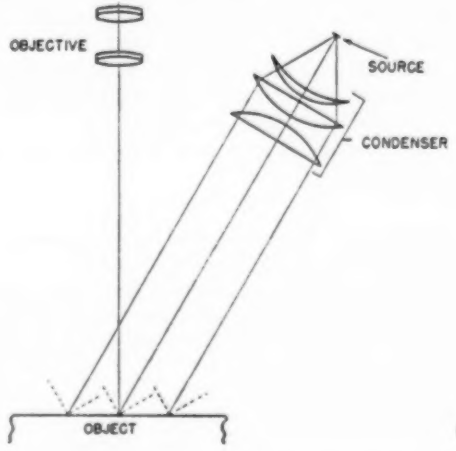


Fig. 2 — Oblique illumination

(To be continued)

INTERNATIONALS

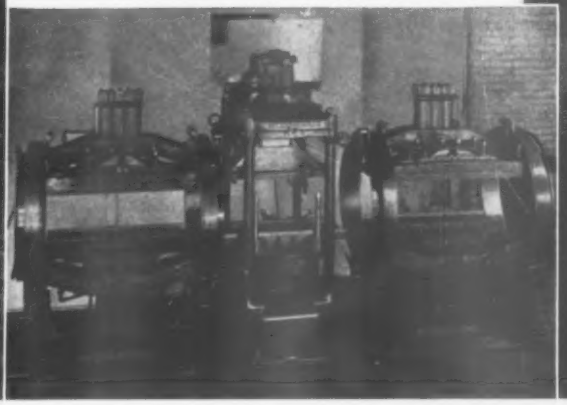
90 Standard Types
1400 Different Sizes

Many Special Designs
to meet
Special Requirements

Foundries in which
MAXIMUM PRODUCTIONS
are maintained are equipped
with

INTERNATIONALS

INTERNATIONAL
MOLDING MACHINE CO.
La Grange Park, Illinois



RESEARCH AND PRODUCT DEVELOPMENT

Discussed at T. and O. Conference

INTENSIVE research and product development activities pointing the way to substantial reduction in production costs, improvements in quality of steel castings, and advantages of cast steel in modern engineering design, were emphasized at the fourth annual Technical and Operating Conference of the Steel Founders' Society of America. Conference attendance established a near-record with 315 registrations. Continuous sessions were held in the Hotel Statler, Cleveland, Sept. 15, 16 and 17.

More than 40 technical papers and individual discussions were devoted to timely technical problems, and to specific developments and advances arising out of the 21 major research projects recently carried out under society auspices. Particular emphasis was directed to newly-completed, exhaustive research on metal fluidity and temperature control, detailed considerations of cost reduction and product improvement through application of specific research in steel casting production, proved methods of redesigning, conversion and reconversion to steel castings, and new developments in foundry practices and equipment.

Presented Summary Reference

Chairman of the T. and O. Committee, John F. Lacey, works manager, Commercial Steel Castings Co., Marion, O., opened the conference Sept. 15 with a summary reference to the far-reaching significance of the society's continuing research and product development programs, and a tribute to the unstinting contributions and inspiration of Thomas H. Shartle, society president.

In his address of welcome, Mr. Shartle, who also is president, Texas Electric Steel Casting Co., Houston, stressed the importance of four major programs sponsored by the society namely, industrial relations, product development, technical research, and the comprehensive activities of Technical and Operating groups in each of the eight divisions. Responsibility for translating, implementing and largely carrying out these "four tools," he said, rests ultimately with the T. & O. groups.

First technical session, with Frank X. Hohn, chief metallurgist, Scullin Steel Co., St. Louis, and C. A. Pope, sales manager, National Traffic Guard Co., Atlanta, presiding, dealt with metal fluidity and temperature control. This session was featured by initial showing of a 45-minute motion picture film, devoted to a visual record of the mechanics of "The Flow of Molten Steel in Sand Molds."

Produced by Armour Research Foundation under the direction of Charles Locke and William C. Wick, as Research Project No. 18 sponsored by the society, the 16-mm color movie permitted observation of the metal flow patterns and surfaces of the resulting castings as well as the action at the gate openings.

Mr. Locke explained that three simple casting designs consisting of a rectangular plate, a circular plate and a spoke wheel were used in the study. The results of the metal flow were transferred from the movie film to enlarged photographs showing comparative flow patterns from various gating systems. The resulting castings were photographed for a more complete study, and any visible defects were correlated with the molten steel flow whenever possible.

Among the more important observations were these:

1. Ingates spaced equidistant from the sprue produce a more uniform temperature distribution within the mold cavity.

2. Gating systems of one ingate closer to the sprue than the other were found to deliver the least and hottest metal from the closest ingate, while the farthest one delivered the most and coldest metal.

3. The speed of pouring will influence the length of time required to completely cover the drag surface but the flow pattern remains the same and can be repeatedly duplicated under the identical gating systems.

4. Single ingate systems cause more mold cavity erosion than multiple ingate systems.

5. The smaller diameter ingates produce the most mold erosion regardless of the gating system used.

6. Ingate areas in excess of the sprue area do not always result in the least amount of mold cavity erosion. Fast filling with low velocity ingates tends to produce plate castings with a minimum of mold cavity erosion.

"The Fluidity of Steel" was the subject of further discussion following the movie, in a paper on fundamentals of the complex subject, prepared by Howard F. Taylor, associate professor of metallurgy, and Brandon G. Rightmire, assistant professor of mechanical engineering, Massachusetts Institute of Technology and presented by the latter.

G. A. Lillieqvist, research director, American Steel Foundries, East Chicago, Ind., followed with a discussion of "Temperature and Metal Fluidity Measurements in Production of Steel Castings." Accurate control of liquid steel temperatures is of extreme importance in the production of quality steel castings with good surface appearance, he showed. The portable optical pyrometer is a good instrument under ideal conditions, he said—and certainly a step ahead of the "melter's eye"—but it does not assure accuracy because ideal conditions are seldom present during the tapping and pouring of a heat. In recent years, however, acceptably dependable equipment for recording molten steel temperatures have been developed. These include the platinum-platinum 10 per cent rhodium immersion thermocouple, the rayotube, and the photoelectronic equipment. Mr. Lillieqvist gave detailed experience records on various equipment used by his company in the research laboratory and at the furnaces, with definitive data on pouring temperatures and fluidity tests, etc.

Pour Spiral Fluidity Test

Successful adaptation of the practice of pouring a fluidity spiral on the melting floor to determine pouring temperature and to assure quality improvement was described by R. J. Jacoby, metallurgist, Key Co., East St. Louis, Ill. Furnace floor practice was established as follows:

After final alloy additions a set-test is taken to determine roughly whether sufficient temperature has been attained to pour the spiral test. The spiral test is poured before tapping, and if out of range, is followed by another test after adjustments have been made to the molten bath. Representative fluidity runs would be 18 to 22 inches for the cold side, 22 to 26 inches for the intermediate or average range, and 26 to 30 inches for the high temperature requirements.

"Metal Fluidity and Temperature Control", particularly as relating to practice in the medium or small foundry, where elaborate equipment

(*Continued on page* 120)

NO UP-HILL CLIMB!
LEADING FOUNDRIES
Say
THE EASY WAY TO OBTAIN AND MAINTAIN HIGHER CASTING QUALITY IS TO USE --
Famous
CORNELL CUPOLA FLUX

Constant use by leading foundries proves that Famous Cornell Cupola flux is quality insurance that pays off.

THE PROVEN RESULTS:

- Cleaner, hotter and more fluid metal.
- More fluid slag.
- Sulphur reduction.
- Sounder, tougher and cleaner castings.
- Easier machining.
- Reduced casting make-overs.
- Reduced cupola maintenance.
- Better casting deliveries.

Write for Bulletin No. 46-B.

TAKES PRACTICALLY NO TIME TO USE.

SCORED BRICK FORM saves digging out of container, weighing and measuring. You simply lift this pre-measured flux out of container and toss it into cupola with each ton charge of iron, or break off one to three briquettes (quarter sections) for smaller charges. Being in solid form, the blast causes no loss up the stack.

NEW DIRECT REPRESENTATIVE:

On and after November 27, 1949, Chris T. Jensen, a native of Wisconsin residing at 2609 East High Street, Davenport, Iowa, will be our direct representative for state of Wisconsin.

MALLEABLE FOUNDRIES, with cupola operation, are showing a rapid trend towards the use of Famous Cornell Cupola Flux. Reports of greatly improved casting production come from every direction. Furthermore, there is a considerable reduction in cupola maintenance labor and cost. The life of cupola lining, whether brick or stone, is greatly prolonged.

The CLEVELAND FLUX *Company*

1026-1036 MAIN AVENUE, N. W., CLEVELAND 13, OHIO

Manufacturers of Iron, Semi-Steel, Malleable, Brass, Bronze, Aluminum and Ladle Fluxes—Since 1918

FAMOUS CORNELL FLUXES
Trade Mark Registered

Write for Bulletins

Famous CORNELL ALUMINUM FLUX

Produces clean, tough castings. No spongy or porous spots even when more scrap is used. Thinner yet stronger sections are poured. Castings take a higher polish. NO FUMES! Exclusive formula prevents obnoxious gases. Metal does not cling to dross.

Famous CORNELL BRASS FLUX

Makes metal pure and clean, even when dirtiest brass turnings or sweepings are used. Produces castings which withstand high pressure tests and take a beautiful finish. Saves considerable tin and other expensive metals. Crucible and furnace linings are preserved.

Famous CORNELL LADLE FLUX

Place a few ounces in bottom of ladle, then tap cupola. Metal is thoroughly cleansed, foreign impurities are easily skimmed off. Ladles are kept clean, there is less patching and increased ladle life. Metal temperatures are retained during transfer to molds.

(*Continued from page* 118)
for determining the temperature of steel in a furnace is not usually available, was treated by C. E. Westin, chief metallurgist, Superior Steel & Malleable Castings Co., Benton Harbor, Mich. Resulting work showed that, regardless of variation in linear relationship between temperature and fluidity, it was apparent that spirals taken at the furnace could be used as a qualitative measure of the flowing power of the heat. Consequently, he said, the heat could be held in the furnace until it attained sufficient temperature or fluidity to run the particular castings for which it was designated.

A high spot of the Thursday meetings was the "Do You Know?" panel, following luncheon, which took the form of a provocative quiz leading to extended discussions of fundamentals developed by the society's research reports. R. C. Wood, vice president, Minneapolis Steel Castings Co., presided.

Friday morning's sessions were devoted to broad consideration of cost reduction and improvement of quality through application of research to the production of steel castings. Fifteen speakers presented definitive evaluations of eight specific research reports of the society. Chairman was E. A. Blasdell, vice president, Reliance Steel Casting Co., Pittsburgh. Three speakers discussed significant phases of "Determination of the Mechanical Properties of Low Alloy Steels as Produced for Castings." The particular report, tabulating hardenability data, impact tests and tensile properties for nine of the most prominent low-alloy steels slightly modified for casting production, each made under four different types of melting procedures, filled a definite industry need, according to D. C. Zuege, technical director, Sivyer Steel Casting Co., Milwaukee. Aside from its value as a means of information outside the industry, it also may be used as a tool for the selection of steels and heat treatments by foundry technical departments, when needed. It has given those steels a favorable position with respect to some of the older high alloy steels, Mr. Zuege said, and stimulated metallurgists to investigate the possibilities of making one or more of these steels, with resultant savings which usually are considerable.

Other speakers were J. O. Shive, chief metallurgist, Sterling Steel Casting Co., East St. Louis; and R. C. Heaslett, Continental Foundry & Machine Co., Coraopolis, Pa. Summarizing the advantages of low-alloy heat treated steels Mr. Heaslett listed four prime conclusions: (1) Low-alloy castings are less difficult to handle through the shop than the high alloy contents, particularly from shakeout blowups, heat-treat defections, straightening and pressing; (2) low-alloy castings are easier to fabricate into weldments or to repair, when required; (3) use of a higher alloy than required for a job is a detriment, rather than an asset, and (4) most importantly, the customer obtains a grade A product, tailored to do the service required, at a lower price.

MALLEABLE FOUNDERS' SOCIETY

Holds Industry Meeting

AN INDUSTRY meeting of the Malleable Founders' Society was held in Cleveland, Sept. 23. Society president James H. Smith, Central Foundry Division, General Motors Corp., Saginaw, Mich., presided. The program consisted of various committee reports and discussion of other subjects of interest to the industry.

A report on the society's investigation of nodular graphite iron, being conducted at the Southern Research Institute, Birmingham, was presented by Leon J. Wise, Chicago Malleable Castings Co., chairman of the project's steering committee. Mr. Wise gave results on various preliminary work in which effect of different nodulizing alloys has been studied. These include magnesium in combination with copper, nickel or ferrosilicon, as well as cerium alloy.

Progress of the Foundry Educational Foundation, in which the Malleable Founders' Society has actively participated since the former's inception, was detailed by George K. Dreher, executive director of the foundation. Mr. Dreher defined the organization's eventual goal as one foundry engineering graduate for each 1000 employees of the foundry industry, or approximately 300 graduates a year. He pointed out that the industry must look to the colleges for its future leaders because the grade or high school graduates who years ago entered the foundry and, despite lack of college training, worked themselves up to managerial posts are the type of individuals who generally are found to be college students under present industrial conditions.

Mr. Dreher stated that with the addition of five more foundation schools next spring, the 12 FEF institutions will have approximately 5000 engineering graduates annually who will have been given a better understanding of cast products and the foundry industry through the broadened courses of foundry engineering training introduced at these schools.

Speaking on the general business situation, John Love, *The Cleveland Press,* declared that the moderate recovery which set in this summer has been effectively terminated for the remainder of the year by uncertainties resulting from the domestic labor and foreign economic situations. He indicated, however, that the halt to recovery is not serious in itself, and pointed out that, in the past, a minor recession, such as the one experienced last winter and spring, has not been immediately followed by a serious one.

Concluding speaker on the program was William T. Bean Jr., research consultant of Detroit and Tulsa, Okla., who discussed casting design. Mr. Bean emphasized the importance of knowing the strength of the selected material, of adopting the correct design for a casting and knowledge concerning the load to which it will be subjected. He also urged the use of modern instruments, such as strain gages, to check a casting's design, adding that testing a part to destruction evaluates the material but not the design. His points were illustrated by slides showing procedure in the design of castings for aircraft engines.

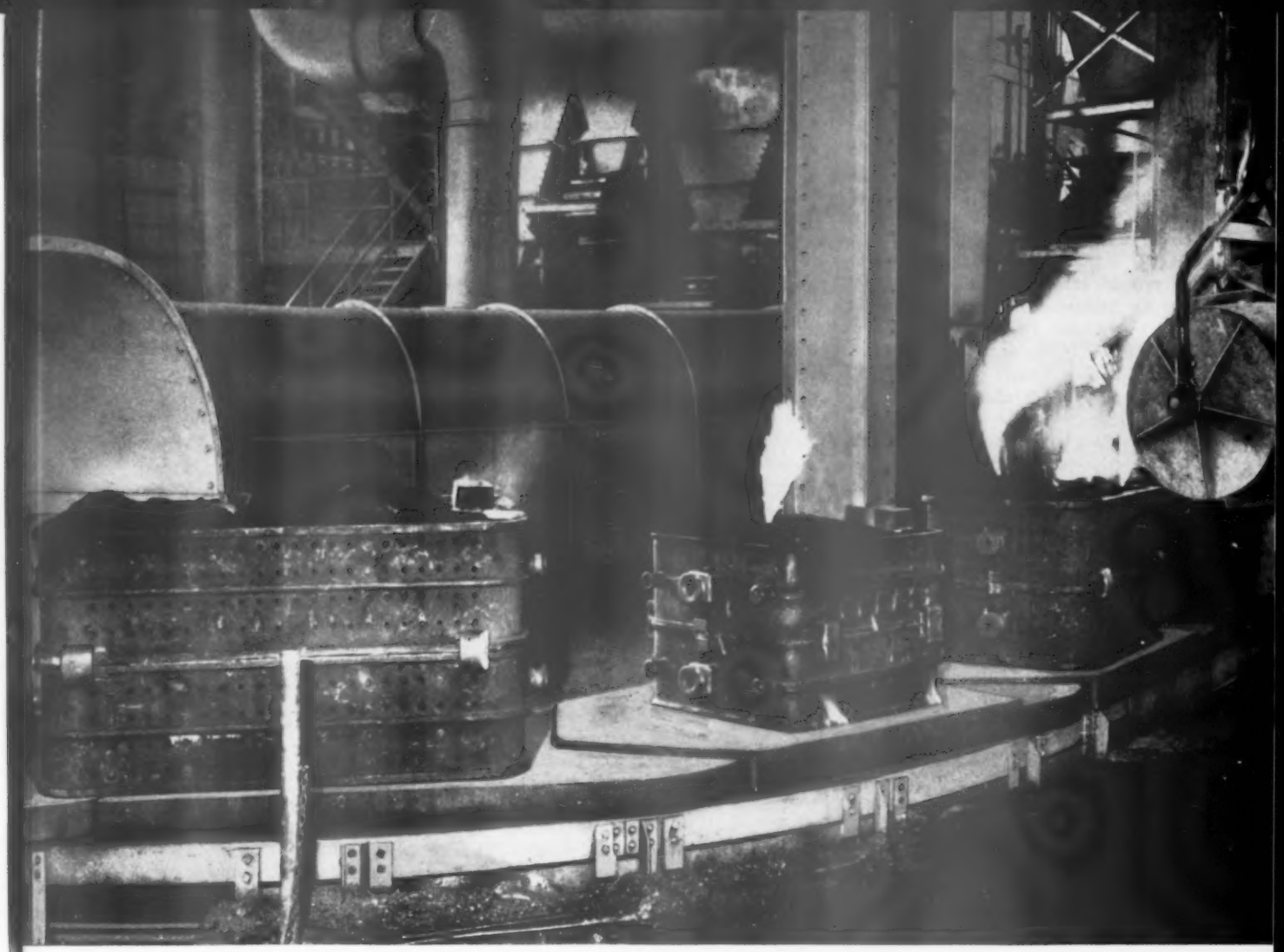
Compares Core Binders

N. F. Koch, Grede Foundries Inc., Milwaukee, and H. W. Meyer, General Steel Castings Corp., Granite City, Ill., discussed "Comparison of Properties of Core Oils and Binders, and Development of Acceptance Tests." Mr. Koch described elaborate baked core tensile tests on 18 oils and concluded that any acceptance test on a new oil should include, besides a satisfactory laboratory strength test, a test run with production cores using at least two barrels of the oil over a period of a week or more to get results under varying operating conditions in the foundry.

Mr. Meyer stated, "we have learned that natural as well as synthetic binders are subject to wide variations as are certain basic sands, thus indicating the need for constant checking to insure suitable properties."

"The Effect of Deoxidation Methods on the Low-temperature Impact Properties of Cast Steel," was discussed by John W. Juppenlatz, chief

(*Continued on page* 122)



Its clover leaf shape saves floor space

If you have ever said "I wish I had room to get more special, short run production out of this plant" (and most foundrymen have) — you'll be interested in the Bartlett-Snow mold conveyor pictured above. It handles 5 sizes of flasks, for castings ranging from 50 to 650 lbs. each . . . and has permitted production of short run work to be more than doubled.

This mold conveyor loops back and forth in tight curls like a clover leaf or pretzel, and thus provides needed cooling time between pouring and shakeout, in minimum floor space. The conveyor is 468 ft. long and consists of 72 cars of Bartlett-Snow's special design, with 6'6" long over-lapping cast iron tops. The conveyor operates intermittently to accommodate the different time cycles of making copes and drags, and the setting of cores, in large, medium and small size flasks.

The entire cooling section of the conveyor is covered with a Bartlett-Snow smoke hood, and a sidewall dust hood catches the dust and smoke at the shakeout, preventing contamination of the foundry air.

Whether yours is a short run jobbing, or long run repetitive production foundry — let the Bartlett-Snow engineers with their long and intimate familiarity with the needs of practical day to day operation study and analyze your present operation —and suggest ways of making better use of your present floor area and more efficient methods of handling sand, and molds and castings. The C. O. Bartlett & Snow Company, 6200 Harvard Ave., Cleveland 5, Ohio. Engineering representatives in New York, Baltimore, Detroit and Chicago.

BARTLETT-SNOW
CLEVELAND 5, OHIO

DESIGNING AND CONTRACTING ENGINEERS

For the Foundry Industry

SAND, MOLD AND CASTINGS HANDLING EQUIPMENT

(*Continued from page* 120)
metallurgist, Lebanon Steel Foundry, Lebanon, Pa., and in a joint paper prepared by E. C. Hummel and L. E. Jones, Utility Steel Foundry, Vernon, Calif. Conclusions developing from this panel included emphasis on the importance of: (1) Selection of proper scrap for the charge; (2) proper furnace conditions; (3) low carbon values; (4) deoxidation with metallic elements rather than silicon reduction from slag; (5) final deoxidation only—3 lb aluminum per ton to be added in the ladle; and (6) rapid cooling from the treatment temperatures to prevent the formation of carbides.

L. C. Hollien, Texas Electric Steel Casting Co., and H. E. Berry, Dodge Steel Co., Philadelphia, headed the panel dealing with "Necked-Down Risers for Production of Steel Castings." Mr. Hollien described practices of his company in application of necked-down risers to castings weighing more than a ton. By way of contrast, Mr. Berry discussed the use of necked-down risers in the production of small steel castings. Consequent savings and general improvement in appearance and dimensional accuracy, he said, have resulted in increasingly wider application to jobbing work.

Additional data on the "Determination of the Factors Influencing Riser Efficiency," was given by R. A. Willey, the Commercial Steel Casting Co., Marion, O.; and J. B. Caine, the Sawbrook Steel Castings Co., Lockland, O. "The Influence of Microstructure on the Mechanical Properties of Cast Steel" was described by J. H. Lowe, Wehr Steel Co., Milwaukee. Robert M. Anson, metallurgist, Crucible Steel Casting Co., Lansdowne, Pa., also discussed the subject. Concluding the panel, R. J. Wilcox, technical director, Michigan Steel Casting Co., Detroit, delivered a paper on "An Investigation of the Surface Finish of Steel Castings."

Interest of the 315 foundry executives reached a peak point of interest in the Friday afternoon session devoted to the provocative "dollar and cents" subject, "Methods of Redesigning Weldments and Forgings to Steel Castings." William J. Phillips, director of the society's product development department, provided an outline of the objectives of the program and a report on extensive activities already under way. Presiding was E. R. Sanford, Penn Steel Castings Co., Chester, Pa., with J. F. Hebert, Skagit Steel & Iron Works, Sedro-Woolley, Wash., as co-chairman.

Heading up the panel on "Suggestion on Methods of Reconversion" by representatives of each of the eight divisional Technical and Operating Groups of the society, John F. Lacey, national chairman, explained the basis on which the typical examples of conversions to steel castings or cast-weld were chosen. These factors he defined as practical considerations of dimensional tolerances, strength in the part, ease of casting, quality improvement, equivalence of cost or lower cost—with no limitations set on the type of conversion selected for delineation.

Starting off the discussions, E. H. Blanton, Atlantic Steel Castings Co., Chester, Pa., described the conversion example selected by Division No. 1. This was a high-pressure, high-temperature steam line fitting, several of which, he said, had been produced recently—converted from a forging to a steel casting. As a forging Mr. Blanton explained considerable time must be expended to machine the bores to drawing dimensions. Lowest obtainable price estimate for forging and rough machining such fitting was $2860, with an estimated weight of 2010 pounds. As a casting, he said, the fitting would weigh 1480 pounds, with no machining required other than on outlets where the fitting is welded into the pipe line. Cost comparatives also were favorable.

Unusual example of a one-time casting converted to a weldment and subsequently reconverted to cast-weld construction, was presented by M. J. O'Brien, Symington-Gould Corp., Depew, N. Y., representing Division No. 2. This was a center filler assembly for a freight car, steel cast in three pieces and welded, resulting in 30 per cent weight saving, with very material reduction of lineal welding.

Convert to Castings

For Division No. 3, C. E. Silver, Texas Electric Steel Casting Co., Houston, cited three examples of conversion from fabricated design to steel castings. These included a heat exchanger outlet, a pipe line cradle, and a drum flange all converted from weldments to steel castings. Favorable cost comparatives, plus improved appearance, utility, integrity, and weight saving were cited.

In a paper prepared by D. Lyle, Continental Foundry & Machine Co., Coraopolis, Pa., representing Division No. 4, conversion of a gin pole rope sheave (pulley) from fabrication to a steel casting was detailed, with similar data on comparative weights, costs and acceptability of finished product.

Conversion of a weldment, previously converted from a steel casting, and again redesigned and reconverted to steel casting, was described by Frank Kiper, Ohio Steel Foundry Co., Springfield, O., for Division No. 5. This unit was a shovel deck for machinery mounting, and represented complicated but highly effective redesign accomplishment, with resulting saving, comparable weight, and decidedly improved construction.

Several conversion examples developed in Division No. 6 were outlined by G. C. Dickey, Harrison Steel Castings Co., Attica, Ind. Among them was a lift arm bracket for a hydraulic loader. Re-design resulted in physical improvements and better appearance, with cost reduced about 20 per cent.

(*Concluded on page* 125)

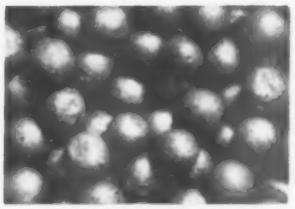
SALES MEETING: Recent annual sales meeting held by Pettibone Mulliken Corp., Chicago, at the Moraine Hotel, Highland Park, Ill., included key executives and regional men of the parent company and its three subsidiaries: Beardsley & Piper, Universal Engineering Co. and George Haiss Mfg. Co.

TRU-STEEL SHOT *LASTS LONGER*

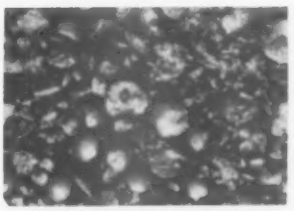
IFE COMPARISON -- TRU-STEEL vs. CHILLED IRON SHOT

Showing relative break-down after a given number of passes through a centrifugal blasting wheel.

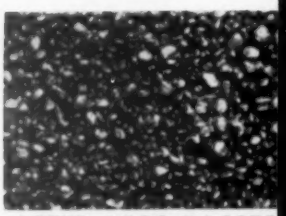
CHILLED IRON
No. 230 at Mag. 10X



NEW SHOT

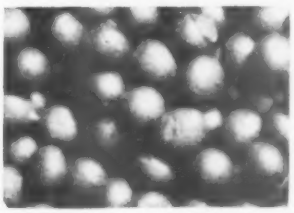


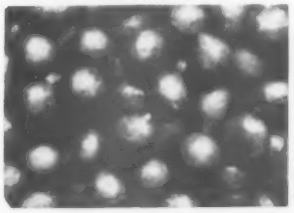
AFTER 50 PASSES

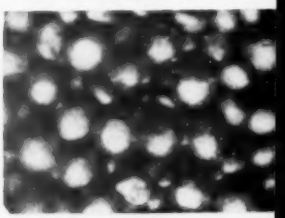


AFTER 1500 PASSES

TRU-STEEL
No. 230 at Mag. 10X







SAVES $1.09 per Wheel Hour for an Ohio Tool Manufacturer*

By replacing Chilled Iron Shot with TRU-STEEL this customer saved 62% on the cost of shot and machine parts, as shown in the chart below. Like many other manufacturers, they found that TRU-STEEL shot lasts many times longer than chilled iron because it wears down slowly without breaking down.

TRU-STEEL Shot is perfectly formed of electric induction furnace steel that has received a full heat treatment — not just a draw or anneal. It is round and solid, hard and tough, accurately graded and controlled as to quality and hardness.

By using TRU-STEEL you will find that wearable parts last longer, less machine maintenance is required, there is less abrasive to ship and store, and cleaning costs per ton are much lower. A test will show you how much you can save. Write today for descriptive Bulletin No. 59.

Name on request

PERFORMANCE CHARACTERISTICS

1. Cleans as fast—or faster—than chilled iron shot.
2. Reduces machine maintenance costs.
3. Increases life of machine parts.
4. Lasts many times longer than chilled iron shot.
5. Saves storage space and transportation costs.
6. Reduces cleaning costs per ton.

COST COMPARISON CHART

TYPE OF SHOT	CHILLED IRON	TRU-STEEL
Shot Used in 80 Wheel Hours	1950 Lbs. (24.4 lbs. per Wheel Hour)	400 lbs. (5 lbs. per Wheel Hour)
Cost of Shot	$ 87.00	$45.00
Cost of Parts	$ 52.65	$ 6.80
Total Cost	$139.65	$51.80
SAVINGS	(80 Wheel hours)	**$87.85**

DISTRIBUTED BY

American
WHEELABRATOR & EQUIPMENT CORP.
505 S. Byrkit St., Mishawaka 2, Indiana

Mfd. by: Steel Shot Producers, Inc., Butler, Pa.

Through the Winter Months "GREAT LAKES" DRIED SANDS

✓ FOR EASY HANDLING
✓ MAXIMUM SAND CONTROL

AVAILABLE FOR PROMPT SHIPMENT

•

LAKE SHARP SANDS
A.F.A. fineness =39, =48 & =55
Artificially Dried & Screened

•

JUNIATA BANK SANDS
A.F.A. fineness =87 & =100
Artificially Dried & Screened

•

SILICA SANDS
from
Illinois, Wisconsin, Michigan,
Ohio and New Jersey
Washed, Dried & Screened

ORDER NOW!

Why experience the annoyance, higher handling and freight costs, which result from sands loaded with frost and often ice? With such sands foundry costs are higher, cores and molds usually not up to your standards!

Look to Great Lakes for thoroughly dried (moisture free) accurately graded sands. Many foundries use Great Lakes dried sands the year around.

A Great Lakes man who knows foundry sand problems will be glad to consult with you. Your inquiry will receive immediate attention.

Great Lakes Foundry Sand Co.
UNITED ARTISTS BUILDING
DETROIT 26, MICHIGAN

MINERS—PROCESSORS—FOUNDRY, METALLURGICAL AND SAND BLAST SERVICE

(*Concluded from page 122*)

and only slight increase in weight. Realistically, Mr. Dickey pointed out, redesign of the part has resulted in 25,000 of these parts being added to industry tonnage.

Another example was a front hinge bracket for a mower, originally a three-piece weldment, converted to a steel casting. Appearance was improved, weight was reduced 16 per cent, and per unit cost after conversion was 28 per cent lower—and 5000 of these steel castings are now being used annually. A third highly significant conversion featured by the speaker was that of a common fabricated brake beam for freight cars, converted to a one-piece steel casting of which more than 150,000 have been produced.

A gear box housing, representing a complicated conversion from a weldment fabricated from many large and small units to a cast-weld unit joining seven cast steel pieces, was described by A. E. Czechowicz, Key Co., East St. Louis, for Division No. 7. Winding up the session J. F. Herbert, Skagit Steel & Iron Works, Division No. 8, dealt with another successful conversion from weldment to steel casting, a bank lever control, perfected with appreciable savings in cost and weight, and decidedly improved appearance and utility.

Discuss Dust Control

Final meeting of the conference, devoted to "New Developments and New Equipment," was opened by H. G. Robertson, American Steel Foundries, Alliance, O., with C. F. Weisgerber acting as assistant chairman. A. A. Diebold, Atlas Steel Casting Co., Buffalo, led off with a discussion of "Dust Control at the Foundry Shakeout." He covered the methods used at Atlas, utilizing spray nozzles, solenoids, compound M proportioners, automatic drain valves and strainers. As a result, he said, dust content per cubic foot was cut to less than half the permissible maximum.

H. H. Blosjo, Minneapolis Electric Steel Castings Co., discussing "The Use of Infra-Red Lamps for Drying Molds," said that practical tests made at Minneapolis have established that the quality of castings can be improved considerably by use of infra-red means of mold drying. Infra-red dryers, he said, assure reasonably uniform rate of drying and preserve the bond at sharp corners. Tests also developed favorable data, cost-wise, he added.

"Mallabrasive Shot vs. Chilled Shot" in modern cleaning room practice, was the subject discussed by H. G. Stevener, American Steel Foundries, Alliance, O. He said that experience suggests three factors are involved in obtaining best results in shot blasting from the cost standpoint: Efficient equipment, proper abrasive, and a shot reclaimer to reclaim all possible shot from the chipping floor and other parts of the shop.

J. G. Buehlmann, Symington-Gould Corp., Depew, N. Y., in a paper on "Material Handling", described palletizing methods used at the Depew foundry for handling of such materials as brick, bentonite, silica flour, sleeves, kordek and others. "Lowering Cleaning Costs Through Use of Magnetic Chucks," was considered in a paper prepared jointly by C. F. Haertel, Falk Corp., Milwaukee, and L. E. Alexander, Minneapolis Electric Steel Casting Co. Summary conclusions of the report of a comparative survey—considering abrasive losses, metal removed, and wheel contact time—were that, beside grinding time, the set-up or handling time on the magnet was considerably less (remembering that all castings can not be used to advantage on the magnet). The survey was kept on a time basis because, in general, saving of time in operation means a saving in cost. On this basis it was found that magnetic chucks institute practical savings, representing a saving in cost where proper jobs are selected, a saving in worker fatigue, and definite improvement in safety practice.

Limiting his comments primarily to large shakeout installations, L. D. McDowell, American Steel Foundries, Chicago, spoke on "Ventilation of a Quad Shakeout Machine." Satisfactory ventilation of large shakeouts which are served with roller conveyors, overhead monorail equipment, or similar methods of flask handling is possible without disadvantageously affecting the shakeout operation, he said, and at the same time affords means of securing acceptable performance in dust collection.

Book Review

Motion and Time Study, third edition, by Ralph M. Barnes, cloth, 559 pages, published by John Wiley & Sons, New York. Price $5.

The many foundrymen who are familiar with the work of Dr. Barnes in the field of motion and time study will be especially interested in this extended text. The third edition enlarges upon the subject, and presents more and diverse illustrations and cases. Five new chapters have been added dealing with process analysis, gang process charts, activity charts and man and machine charts.

International Group Sets Congresses

The United States will hold the International Foundry Congress in 1952, it was announced following a meeting of the International Committee of Foundry Technical Associations held during the recent congress in Amsterdam. Belgium was designated for the congress in 1951, France in 1953, Italy in 1954 and Great Britain in 1955, the latter two subject to confirmation. Previous plans for the international congress of 1950 in Italy have been cancelled and none will be held next year. However, the International Committees will meet during the British national convention next June.

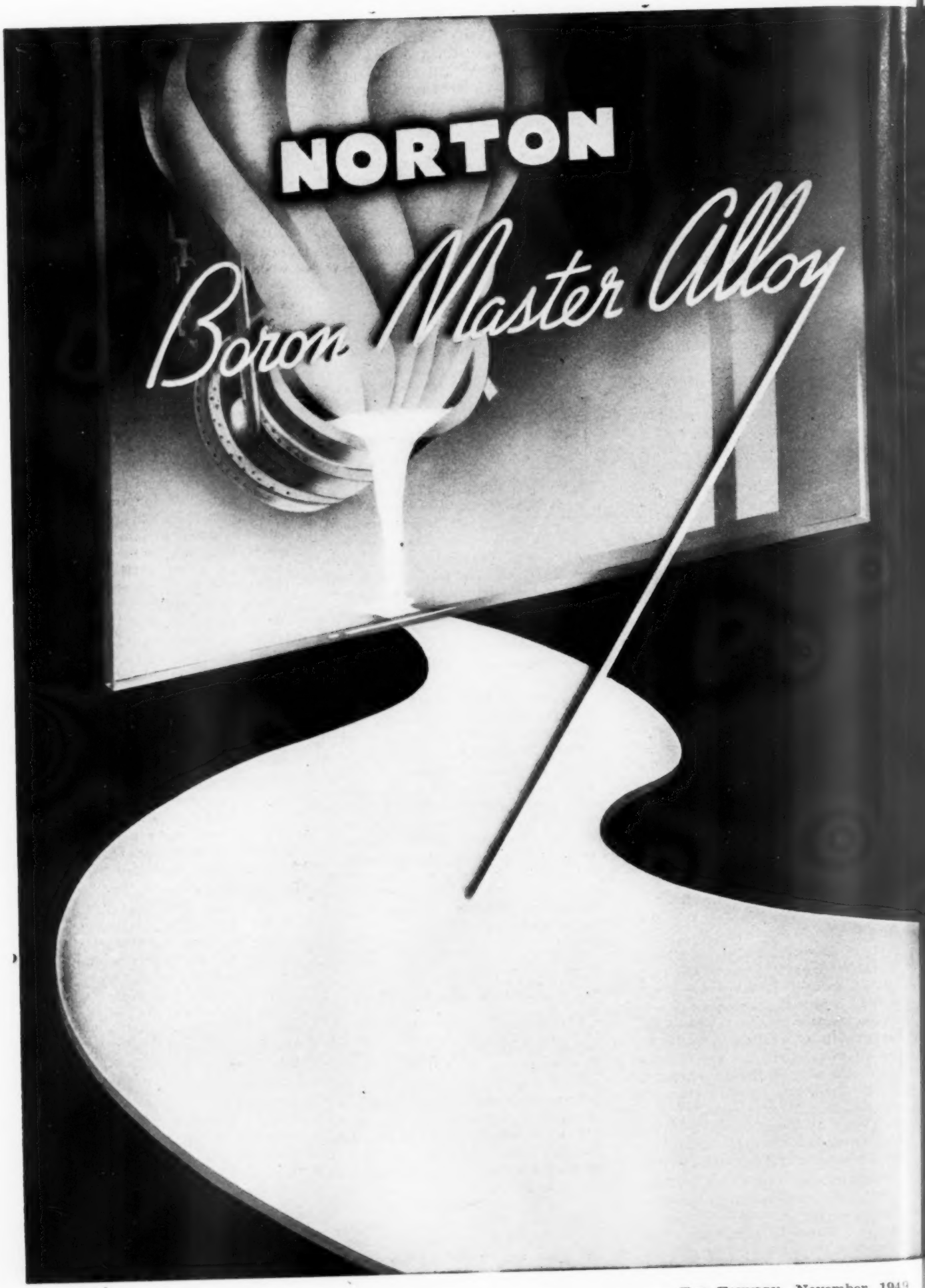
The committee meeting, held Aug. 29, was attended by R. Deprez and E. Commins for Belgium; Prof. Fr. Pisek and Dr. Ing. A. M. Plesinger for Czechoslovakia; Dr. M. Ballay and A. Brizon for France; D. R. Wood and V. C. Faulkner for Great Britain; F. W. E. Spies, president of the Dutch Technical Foundry Association, and R. Reitsema for the Netherlands; Comm. M. Olivo and M. Perego for Italy; Prof. K. Gierdziejewski and Cz. Kalata for Poland; V. Delport and A. W. Gregg for the United States and Tom Makemson, honorary secretary. President R. Deprez, who also is president of the Belgium Technical Foundry Association, presided.

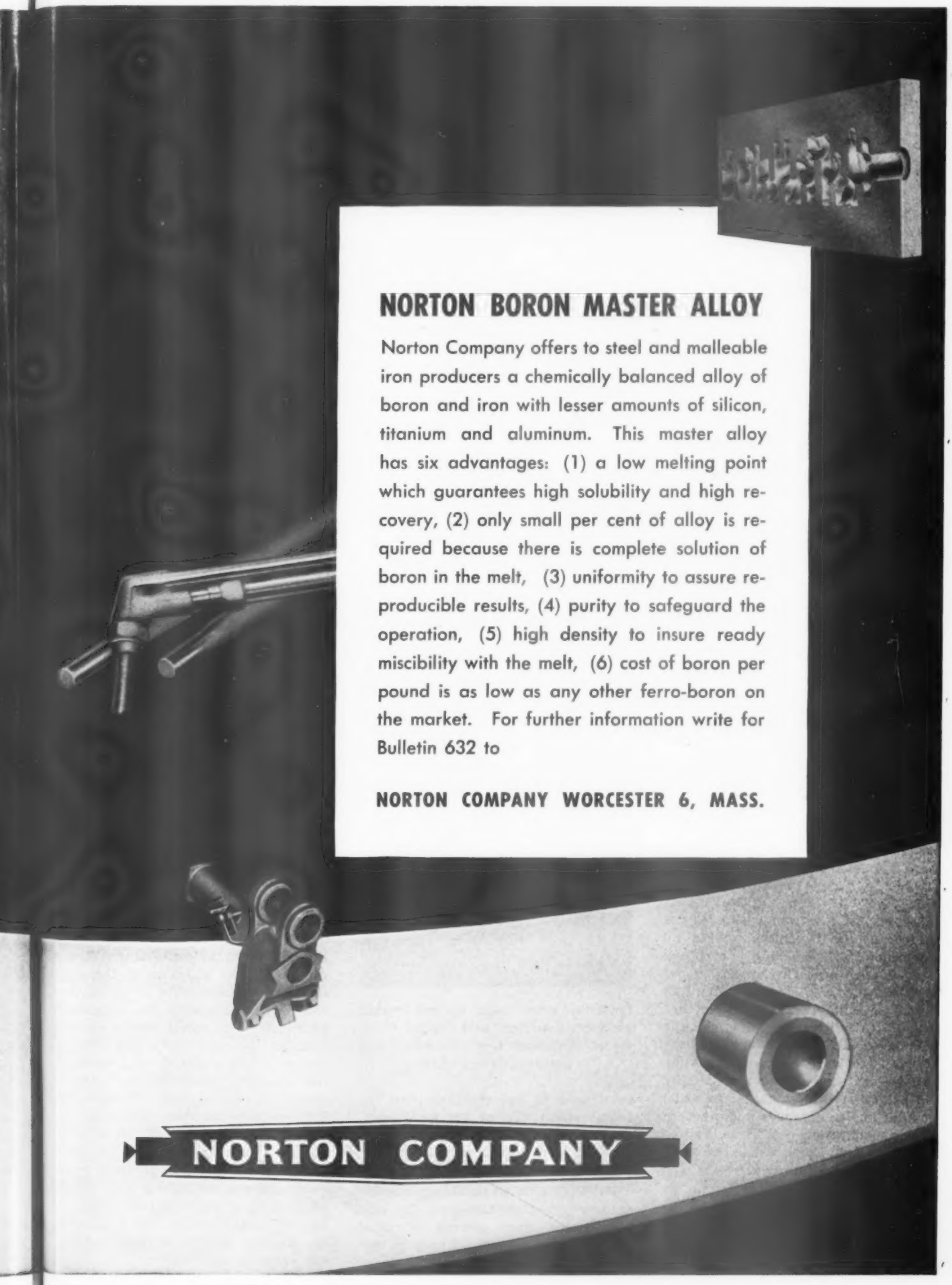
Reports from the Committees on Testing Cast Iron and on Foundry Defects were considered. It was decided to revive the subcommittee in charge of the International Dictionary of foundry and metallurgical terms. The new subcommittee met Aug. 31, and outlined plans for the preparation of a dictionary on more extensive lines than had been drawn up in earlier years.

The following were elected officers of the International Committee for 1950: President, Prof. Dr. Fr. Pisek, immediate past president of the Czechoslovak Technical Foundry Association; vice president, F. W. E. Spies, president of the Dutch Association. Tom Makemson, secretary of the Institute of British Foundrymen, was re-elected honorary secretary.

At the meeting of the International Committee on Testing Cast Iron which followed, a program of work proposed by Dr. J. E. Hurst, British delegate and immediate past president of the committee, was adopted.

Plans were made during the meeting of the International Committee on Foundry Defects, held Aug. 31, to improve and extend the scope of existing atlases of foundry defects.


NORTON
Boron Master Alloy


NORTON BORON MASTER ALLOY
Norton Company offers to steel and malleable iron producers a chemically balanced alloy of boron and iron with lesser amounts of silicon, titanium and aluminum. This master alloy has six advantages: (1) a low melting point which guarantees high solubility and high recovery, (2) only small per cent of alloy is required because there is complete solution of boron in the melt, (3) uniformity to assure reproducible results, (4) purity to safeguard the operation, (5) high density to insure ready miscibility with the melt, (6) cost of boron per pound is as low as any other ferro-boron on the market. For further information write for Bulletin 632 to
NORTON COMPANY WORCESTER 6, MASS.
NORTON COMPANY

By EDWIN BREMER

FOUNDRY Developments

GEIGER counter, famed for its ability to detect uranium and other radioactive materials, has been adapted by scientists of the Research Laboratory, U. S. Steel Corp. of Delaware, to the development of a quick and accurate method for determination of chromium, manganese, molybdenum, nickel, copper, columbium, titanium, tungsten and vanadium in steel. Method is expected to be faster than the direct-reading spectrographic method. Application of the Geiger counter is based on its capability of measuring invisible fluorescent rays developed by those elements when subjected to powerful x-rays. Any specimen of steel which has a flat surface and is reasonably clean suffices.

* * *

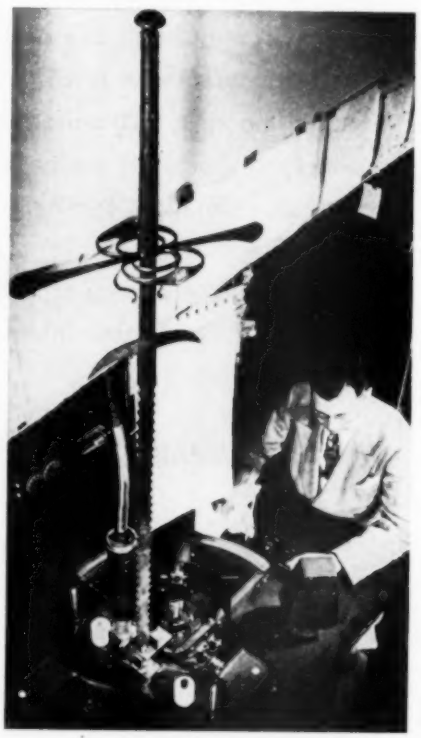
AT THE recent International Foundry Congress held in Amsterdam E. M. H. Lipps, Philips Gloeilampen Fabriken, described a vacuum diecasting method for small parts which had to be free from entrained air. Mold or die is placed above the metal bath with a metal tube connecting the two. Die is evacuated and metal drawn into it. Opening die permits metal in tube to drop back into bath. Alloys used successfully include lead and zinc-base.

* * *

RECENT U. S. patent No. 2,478,-723 describes a ferrous base alloy for piercer points to contain 0.20 to 1.0 per cent C, 0.50 to 1.50 per cent Mo, 8 to 30 per cent Cr, 2.0 to 3.0 per cent Al, 0.50 to 1.50 per cent Cu, 0.20 to 1.0 per cent V, 0.25 to 1.25 per cent Si, 0.25 to 1.25 per cent Mn, and the remainder all iron and including the usual percentage of S and P. Alloy can be cast and is characterized by the ability to form an aluminum oxide coating and to retain it under severe heat and abrasion conditions, and to retain its cast shape under the same conditions.

* * *

COMPREHENSIVE study of the mechanical properties of some 200 magnesium alloys by Rensselaer Polytechnic Institute for the Air Force indicates that the Mg-Zn-Ag-Mn-Ca system is the most promising for further study and development, according to a report now available from the Office of Technical Services, Department of Commerce, Washington 25. The report PB 97657 "New Magnesium Alloys" contains 243 pages and sells for $31.25 in photostatic form and for $9 in microfilm. One promising alloy containing 5 per cent Mg, 1 per cent Zn, 1.5 per cent Mn, and 0.3 per cent Ca still has the drawbacks of hot shortness and extreme sensitivity of its mechanical properties to small variations in composition and handling procedures.



Powerful x-ray tube at left makes elements flouresce, and Geiger counter on quadrant track identifies and measures intensity of rays

* * *

DIFFICULTY in obtaining a satisfactory graphite structure in cast iron piston rings poured in metal molds by the centrifugal process was solved by use of a core sand sleeve or liner, according to P. Januszewicz, Kolo Odlewnikow SJMP, Poland, in a paper presented at the International Foundry Congress held in Amsterdam. Ring pots cast in water-cooled metal molds coated with 1 mm (0.039-in.) of dry silica sand showed considerable eutectiform graphite structure as did metal molds which were not water cooled. Use of a core sand liner 10 mm (0.39-in.) thick in the metal mold provided the desired structure—fine, uniformly distributed lamellar graphite.

* * *

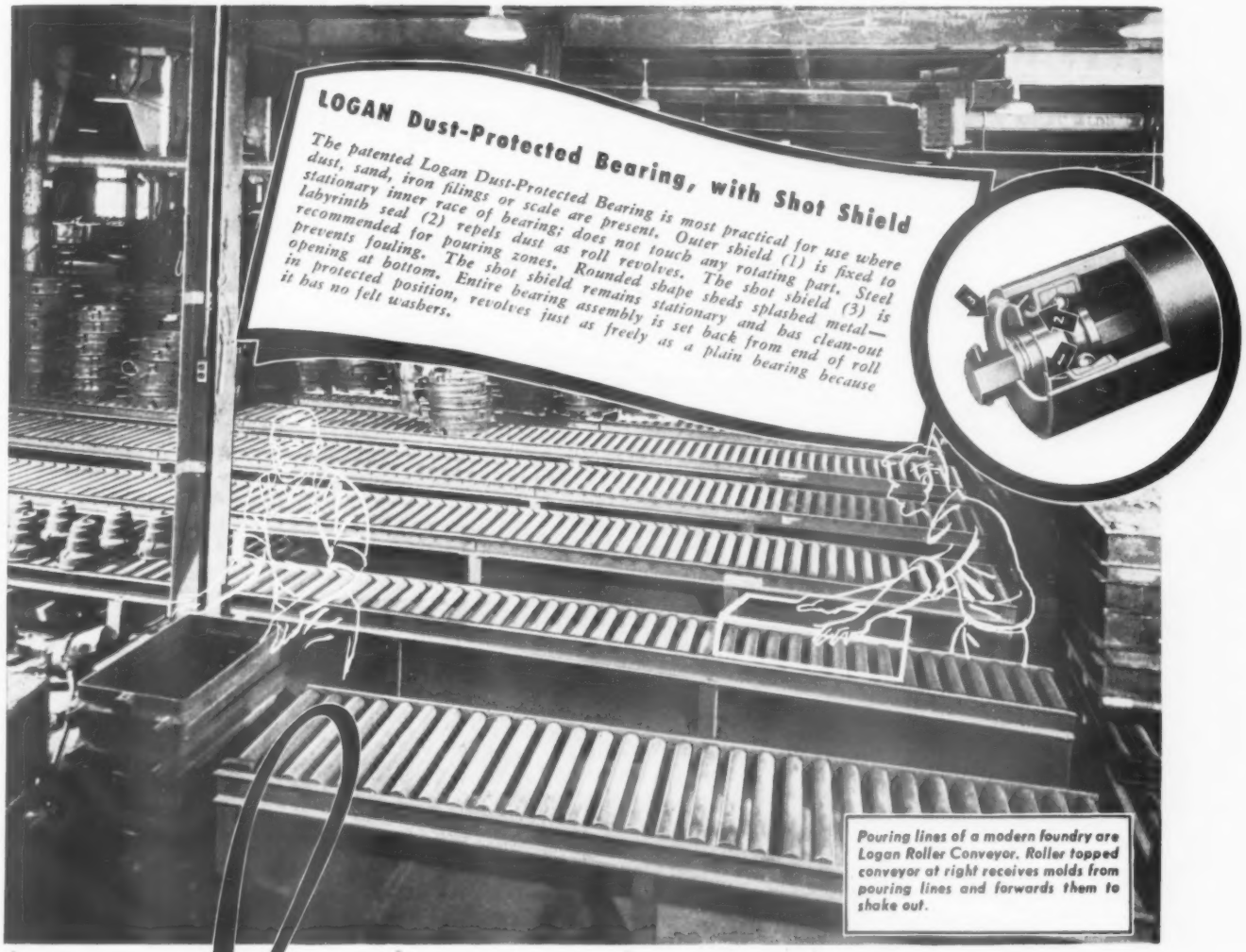
IN DISCUSSING "Some Results of Belgian Research on Nodular Cast Iron," Prof. Albert de Sy, University de Gand, suggested a formula for determining the quantity of magnesium to be added which takes the form:

$$Mg = \frac{a + bM + 0.75S}{n}$$

where a is the coefficient for residual Mg left after treatment, bM the coefficient for mass, S the original sulphur content of the iron, and n the coefficient for efficiency of operation. While sufficient work has not been done to determine the values of the various coefficients, information obtained on specimens around 4 in. in diam, shows a + bM to be 0.07, and n to be 0.5.

* * *

ARTICLE on "Spheroidal-graphite Cast Iron" by Braidwood and Busby in the Sept. 15 issue of *Foundry Trade Journal* directs attention to the high shrinkage characteristic of that material and points out that wherever practicable the metal should be fed through the riser into the casting cavity. Well designed off-feeders of the open-top, closed-top or atmospheric types are quite effective. It also suggests that the basic-lined cupola may be an ideal unit for making that type of iron since it provides high-carbon, low-sulphur iron, even from charges containing substantial proportions of steel scrap. Magnesium can be added safely and efficiently by alloying with a suitable carrier, for example nickel.


LOGAN Dust-Protected Bearing, with Shot Shield
The patented Logan Dust-Protected Bearing is most practical for use where dust, sand, iron filings or scale are present. Outer shield (1) is fixed to stationary inner race of bearing; does not touch any rotating part. Steel labyrinth seal (2) repels dust as roll revolves. The shot shield (3) is recommended for pouring zones. Rounded shape sheds splashed metal—prevents fouling. The shot shield remains stationary and has clean-out opening at bottom. Entire bearing assembly is set back from end of roll in protected position, revolves just as freely as a plain bearing because it has no felt washers.
Pouring lines of a modern foundry are Logan Roller Conveyor. Roller topped conveyor at right receives molds from pouring lines and forwards them to shake out.

Best in the long run

. . . and in the short run too! Logan Conveyors are preferred by foundry men because designed by a *pioneer* in the industry, because they are *correctly engineered*, and because of the *heft* and *strength* that are built into every inch of Logan equipment used in foundries.

Long runs or short runs—Logan Conveyors do the handling job quicker, better, at less cost . . . and least maintenance.

Keener competition is in the offing . . . for every foundry. Those cost-corners must be cut, sooner or later. That's why it is good business today to conveyorize every possible operation. Write for Logan literature or for an engineer to call — no obligations.

CONVEYORS ARE PART OF THE PROCESS

Logan Conveyors

LOGAN CO., 580 CABEL ST., LOUISVILLE 6, KY.

INTERNATIONAL FOUNDRY CONGRESS

Draws Visitors to Amsterdam

By VINCENT DELPORT
European Manager
THE FOUNDRY

AMSTERDAM, the commercial capital and largest city of the Netherlands, where nearly all the streets border a canal, was the setting for the 1949 International Foundry Congress, the second since the end of the war. It is symptomatic of the measure of recovery achieved by the people of Holland that the congress should have been held with outstanding success, thanks to the careful planning and co-operative spirit of the organizing committee headed by Ir. A. Baron Krayenhoff. The whole proceedings were further marked by the blending of courtesy and cordiality which the Dutch hosts showed to their visitors.

The congress, held Aug. 29 to Sept. 2, at the Royal Institute of the Indies, was organized by the Dutch Technical Foundry Association, under the high patronage of Prince Bernhard of the Netherlands. The chairman of the congress was Ing. F. W. E. Spies, general manager of the Royal Dutch Iron & Steelworks of Ymuiden and president of the Dutch foundry association. Rene Deprez, president of the Belgian Technical Foundry Association and of the International Committee of Foundry Technical Associations, was the principal guest of honor, acting on behalf of the member associations of the committee. About 120 foreign visitors from some 12 countries added their numbers to the members of the Dutch Technical Foundry Association.

Twenty-three papers were discussed during the technical sessions, including official exchange papers contributed by the technical associations of Belgium, Czechoslovakia, France, Great Britain, Italy, Poland and the United States. A number of works visits were arranged, covering different types of foundries and the blast furnaces and steelworks, rolling mills and pipe foundry of the Royal Dutch Iron & Steelworks at Ymuiden.

The congress was opened the morning of Aug. 29, with president F. W. E. Spies in the chair, supported by the delegates of foreign associations to the Internationl Committee of Foundry Technical Associations. Mr. Spies conveyed the greetings of the Dutch association to the visitors, to which Rene Deprez replied on behalf of the foreign associations.

The meeting was formally declared open by Dr. A. Winsemius, general director for industrialization, representing the minister of Economic Affairs, who mentioned that the occasion was the first one when an international congress of this nature had been organized in the Netherlands. He also referred to the importance of industrial development in Holland in order to keep pace with the increasing population and to solve the problem of balance of payments, and he stressed the considerable importance of the foundry industry in this respect.

Prof. Ir. D. Dresden, president of the National Council for Industrial Research, followed with a short review of the foundation of the Dutch Technical Foundry Association, which came to being as the eventual outcome of the publication of a technical journal launched in 1920; since then the association has largely contributed to the technical education of all grades of foundry workers, and has helped to animate a spirit of co-operation among competing foundrymen.

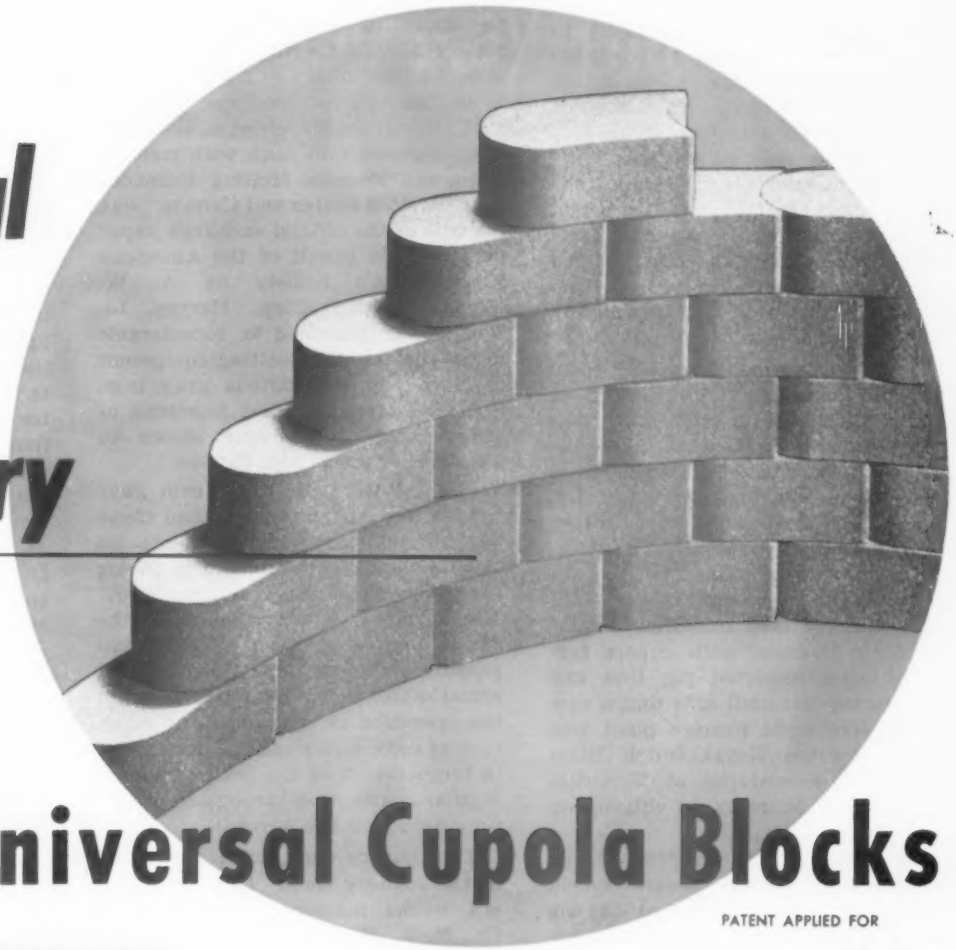
President Spies then delivered his presidential address, in which he reviewed the history, development and present situation of the Dutch foundry industry. Already in the early history of the iron foundry in the Netherlands two distinct groups can be found, namely one which used pig iron supplied from abroad and the other which made the pig iron themselves, produced from lean ores found in the Netherlands. The first records about an iron foundry in Amsterdam date from 1619. The products of those days were hand grenades, cannon balls, household articles, ballast weights for ships, etc.

Earlier still, in the time of King

(*Continued on page* 132)

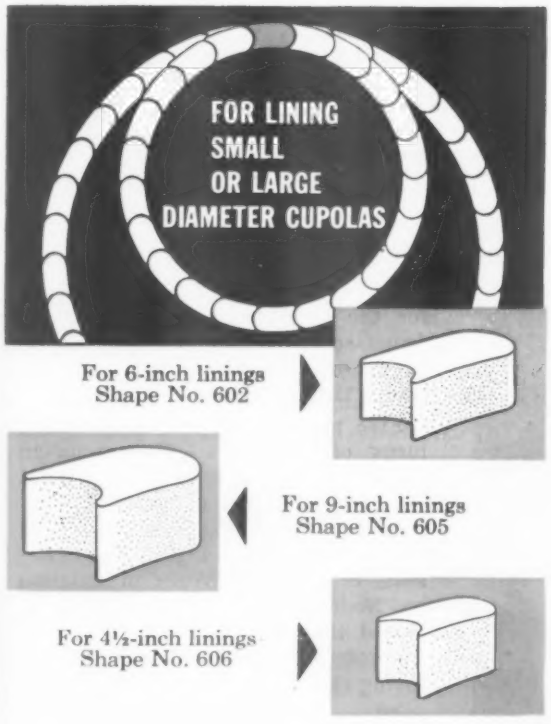
Group attending the International Foundry Congress shown outside the Royal Institute of the Indies, Amsterdam. Representing the American Foundrymen's Society, and shown near the center of the second row, were A. W. Gregg, Whiting Corp., and Vincent Delport, European Manager, *The Foundry*

The Ideal Foundry Refractory



H·W Universal Cupola Blocks

PATENT APPLIED FOR



For 6-inch linings
Shape No. 602

For 9-inch linings
Shape No. 605

For 4½-inch linings
Shape No. 606

ONE SHAPE FOR ANY DIAMETER

Cupolas of any diameter—from less than two feet to eight feet or more—can be fitted with one shape of H-W Universal Cupola Blocks. This is made possible by the fitted-curve of the blocks, which maintains complete contact over the entire end surfaces of adjacent blocks, regardless of the diameter of the circle. Thus, only one size block need be carried in stock for a given thickness of lining, for all sizes of cupolas. They can be fitted perfectly into stacks that are somewhat out of round. They are laid up quickly, are very easy to handle, and make a strong, tight joint.

The utmost care is used in the manufacture of Harbison-Walker Universal Cupola Blocks. Clays are carefully selected and accurately proportioned to make the refractory best suited for each particular service condition. Three sizes of Harbison-Walker Universal Cupola Blocks are offered to meet your requirements for linings of various thicknesses. Send for new bulletin on Harbison-Walker Universal Cupola Blocks.

TRADE MARK
REG U S PAT OFF

Harbison·Walker
REFRACTORIES COMPANY *and Subsidiaries*
GENERAL OFFICES · PITTSBURGH 22, PA.

WORLD'S LARGEST PRODUCER OF REFRACTORIES

(*Continued from page* 130)

Gustav Adolph of Sweden (1594 to 1632) it was the technical knowledge of the Dutchman Louis de Geer which brought the Swedish iron industry of Dannemora and Finspong to considerable development. At the time Henry Bessemer was born (his father was a Dutch typefounder) five or six iron foundries were all that were necessary to supply the needs of the Netherlands. About 1830, four iron foundries produced approximately 1500 tons per annum.

Figures from the year 1836 show that the same four iron foundries produced 3000 tons a year, which was then about 75 per cent of the Netherland's requirements. In this period a beginning was made with the use of preheated blast in the blast furnace by Nering Bogel in Deventer. During the years 1870 to 1890, however, the charcoal furnaces had to be shut down and the iron foundries continued their business with cupola furnaces, using imported pig iron and coke. It was not until 1924 that a new and modern blast furnace plant was erected by the Royal Dutch Blast Furnace & Steelworks at Ymuiden, on the coast; it depended entirely on imported iron ore.

Requirements of the Netherlands for foundry products before World War II may be estimated at 160,000 tons a year. Production was then approximately 105,000 tons, so that 55,000 tons had to be imported. Owing to the increasing industrialization of Holland the requirements in the near future may be estimated at approximately 200,000 tons per year. In the Netherlands at present are 98 foundries which, in 1948, produced approximately 132,000 tons of foundry products. To this should be added roughly 8000 tons of steel castings.

Of the papers presented at the technical sessions, two dealt with melting furnaces. "Ferrous Melting Furnaces in the United States and Canada" was the title of the official exchange paper presented on behalf of the American Foundrymen's Society by A. W. Gregg, Whiting Corp., Harvey, Ill. This paper described in considerable detail the types of melting equipment employed by the various gray iron, malleable iron and steel foundries of the country. Slides were shown to illustrate typical installations.

P. G. Maceraudi from Turin gave the Italian exchange paper and chose for his subject: "Experiments on the Balancing and Preheating of Air for a Cupola of 900 mm. Diameter." The author concludes that when the air is preheated, even at low temperatures (about 150° C), there is a remarkable general improvement in the operation of the cupola, an economy of coke consumption, an increase in temperature of the iron, and more regular combustion through improved functioning of the tuyeres.

Two papers dealt with operations in the foundry shop. Ir. J. J. Manders, works manager, G. Dikkers & Co., N. V., Hengelo, and H. R. Bruce, production manager of the same firm, contributed a paper on "Materials Handling in Jobbing Foundries." In a paper entitled "The Manufacture of Metal Patterns and Coreboxes without Machining by the Clay Plaster Method," J. van Yperen described a method of preparing metal patterns and coreboxes used at the N. V. Werkspoor engineering works of Utrecht.

Sand was discussed in two papers. One of these was the exchange paper from the Czechoslovak Technical Foundry Association. Contributed by L. J. Petrzela, its subject was "Contribution to the Study of the Preparation of Molding Sands." "Standardization of Molding Sand Testing, with Special Reference to Water Absorption" was the subject of a paper by Ir. M. Stap, of the Central Institute for Testing Materials, Delft. The author surveys the best known methods for testing sands, and refers to the methods adopted by the American Foundrymen's Society, the method of G. Fisher in Switzerland, the D. I. N. Entwurf method (Germany) and the A. Swagerman method (the Netherlands).

Use Vacuum System

In a paper entitled "A Special Diecasting Method," E. M. H. Lips, chief engineer, N. V. Philips' Gloeilampen Fabriken Eindhoven, describes a diecasting machine in which the mold is evacuated before being filled with metal, so that no air remains present, thus obviating the formation of blisters due to air inclusions.

The exchange paper from the Polish Foundry Technical Association was by P. Januszewicz, "Kolo Odlewnikow" S. J. M. P., Poland. The title was "Car Engine Piston Rings Cast Centrifugally in the Form of Sleeves."

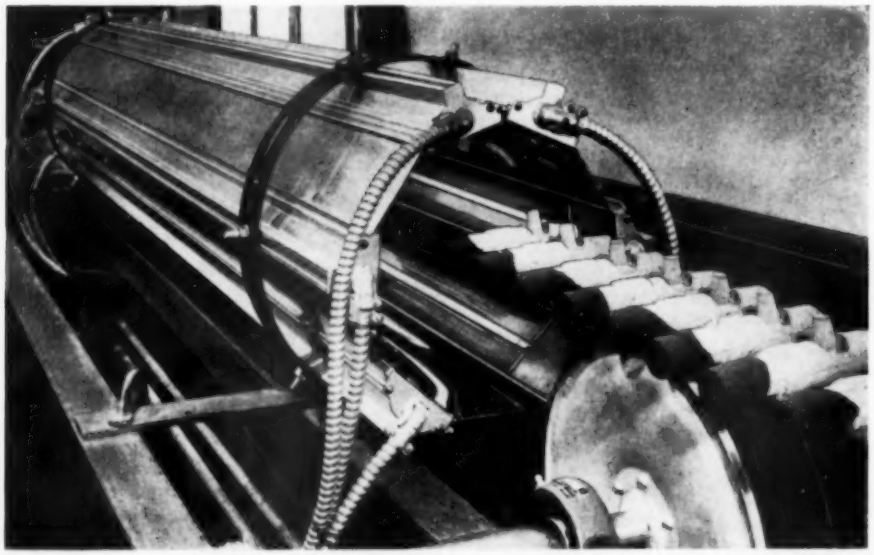
J. G. P. Bruschke, Werkspoor N. V., Holland, presented a contribution on "The Manufacture of Ingot Molds in Cement Sand." Cement sand is used solely for the mold as well as for the core, and this method was found satisfactory for castings having a wall thickness ranging from 100 to 125 millimeters.

Five papers dealt with the metallurgy of cast iron. The exchange paper from the Belgian Technical Foundry Association was by Prof. Albert de Sy, of the University of Ghent, the subject being "Some Results of Research Work in Belgium on Nodular Cast Irons." He mentioned that, in Belgium, magnesium is preferred, at present, as the alloying element.

"Some Heat Transfer Problems Simplified" was the title of a paper by J. S. Abcouver, foundry manager, Verkspoor N.V., Amsterdam and Utrecht. The paper deals with the effect of heat transfer on heating, crystallization and cooling.

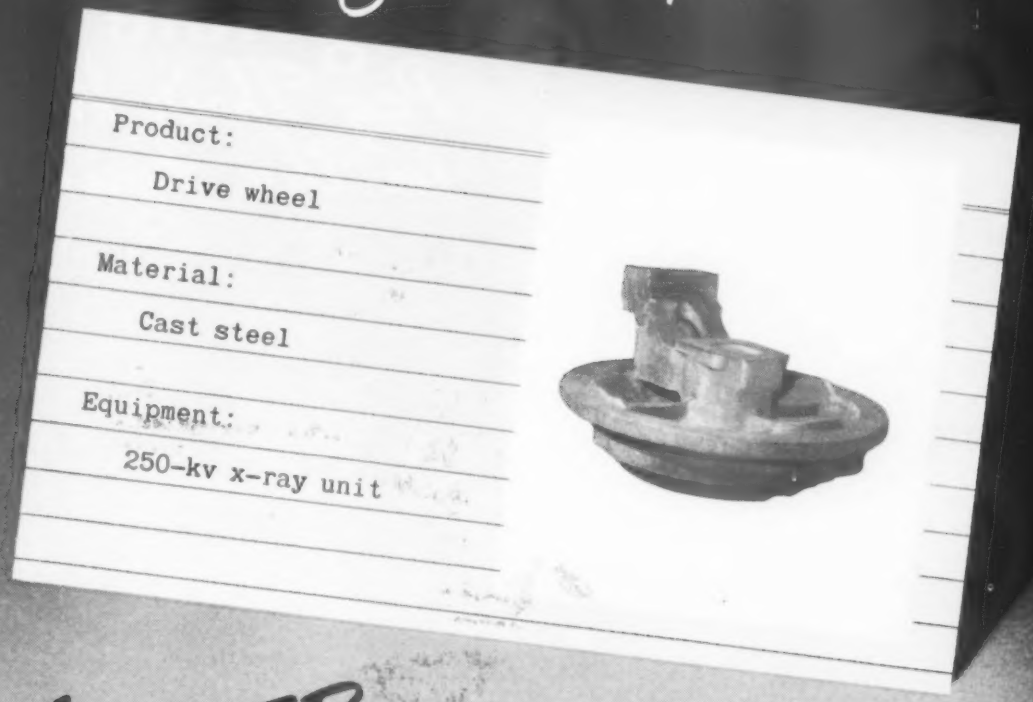
J. D. Fast, of Philips' Research

(*Concluded on page* 135)



CORE DRYING: A full day's production capacity of wash-dipped sand cores is being turned out in 3 hr by Milwaukee Flush Valve Co., Milwaukee, Wis., with a new electric infrared oven. The oven consists of six all-metal Chromalox radiant heaters mounted at angles to form a circular drying tunnel. According to the company, breakage has been reduced by the new oven as cores are dry in approximately 2 minutes after dipping

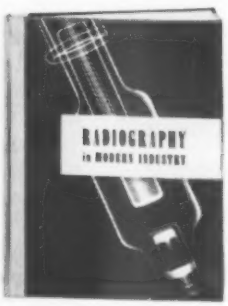
What's the right X-Ray film?



ANSWER:

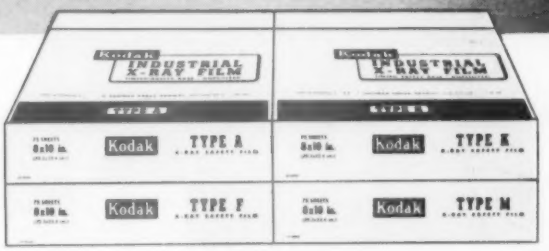
KODAK INDUSTRIAL X-RAY FILM, TYPE F

Because the equipment had only moderate power and section thicknesses up to 3¼ inches were to be examined, the radiographer chose Kodak Industrial X-ray Film, Type F, exposed with Kodak Industrial X-ray Intensifying Screens. This film is designed for use with fluorescent screens to provide maximum speed. The combination is essential in boosting equipment capacity to handle a heavy job like this. And, since the examination is for gross defects, speed is more important than sensitivity to very fine detail.



RADIOGRAPHY IN MODERN INDUSTRY

A wealth of invaluable data on radiographic principles, practice, and technics. Profusely illustrated with photographs, colorful drawings, diagrams, and charts. Get your copy from your local x-ray dealer—price $3.



A TYPE OF FILM FOR EVERY PROBLEM

To provide the recording medium best suited to any combination of radiographic factors, Kodak produces four types of industrial x-ray film.

Type F gives the highest available speed and contrast when exposed with calcium tungstate intensifying screens. Has wide latitude with either x-rays or gamma rays, exposed directly or with lead screens.

Type M provides high contrast and exceptional detail under direct exposure or with lead-foil screens. It has extra-fine grain, and speed is adequate for radiography of light alloys at moderate kilovoltages and for much million-volt work.

Type A offers high contrast with about three times the speed of Type M, but with slightly more graininess. Used direct or with lead-foil screens for study of light alloys at lower kilovoltages, and of heavier steel parts at 1,000 kv and with gamma rays.

Type K has medium contrast with high speed. For gamma ray and x-ray work where highest possible speed is needed at available kilovoltage without use of intensifying screens.

EASTMAN KODAK COMPANY
X-ray Division · Rochester 4, N. Y.

"Kodak" is a trade-mark

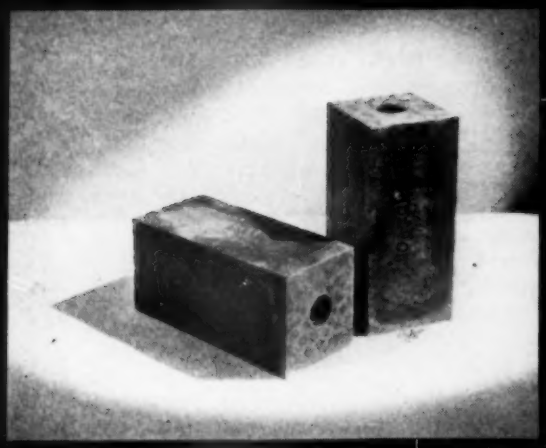
Radiography

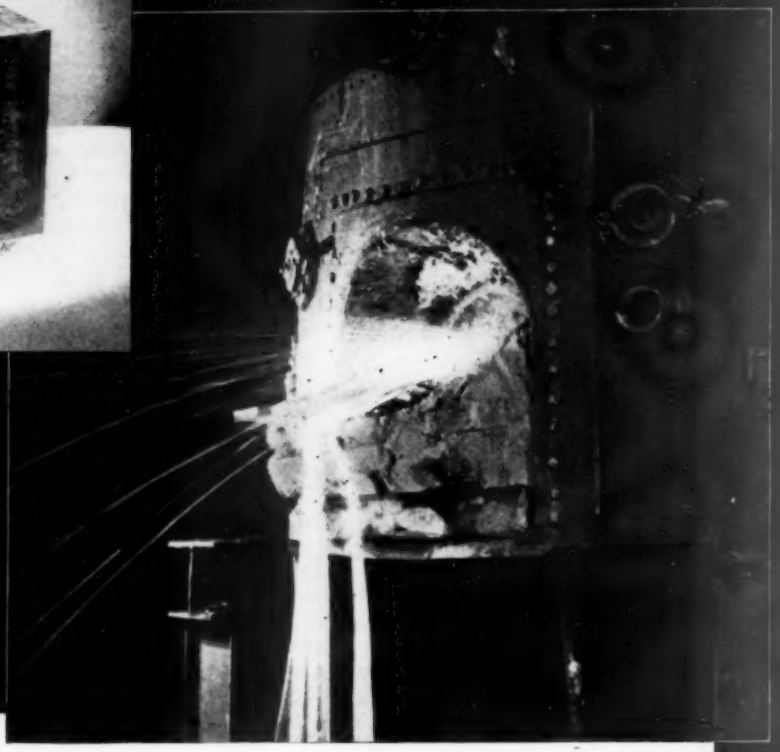
another important function of photography

Kodak

CRYSTOLON Slag Hole Blocks

Pay Their Way in the Foundry





CRYSTOLON slag hole blocks, made by Norton Company of densely bonded silicon carbide grain, give long trouble-free service in foundry cupolas. The hard, dense surface of these chemically inert blocks is resistant both to the abrasion and penetration of molten slag.

CRYSTOLON blocks resist all slag action either by corrosion or erosion. Consequently the hole size is maintained for a longer period of time, giving better control of the flow. These rugged slag hole blocks are highly refractory and will neither soften nor spall at temperatures up to 1650°C.

NORTON REFRACTORIES LIKE HEAT

NORTON COMPANY · WORCESTER 6, MASS.

(*Concluded from page* 132)

Laboratories, N. V. Philips' Gloeilampen Fabrieken, Eindhoven, presented a paper on "The Influence of Oxygen, Nitrogen and Carbon on the Impact Strength of Iron and Steel." J. E. de Graaf, Laboratories of the K. N. Blast Furnaces and Steelworks, Ymuiden, discussed "A Special Case of Carbon Diffusion from Cast Iron to Steel." Another paper was "The Temperature of Liquid Steel in Relation to Fluidity and Sand Burning for Steel Castings," by A. J. Zuithoff, Laboratory of the Nederlandsche Staalfabrieken, N. V. Demka, Utrecht.

Testing was discussed in two papers. One, by Ing. L. van Ouwerkerk J. M. L. zn., on "Nondestructive Testing of Castings," described and gave comparative information on the latest types of nondestructive methods of testing. "The Correlation between Different Hardness Numbers for Gray Cast Iron" was the title of the contribution by Jan Wozniacki, the Research Institute of Krakow, Poland.

Nonferrous metal castings were treated in three papers. One by A. Swagerman and Ir. H. Leutscher, G. Dikkers en Co. N. V., Hengelo, had for its title "Some Metallurgical and Practical Aspects on the Melting of Copper Alloys." A British contribution by F. C. Evans, John Miles & Partners (London) Ltd., was on "Foundry Melting Furnaces for Copper and Nickel Base Alloys." The author discusses the relative merits of various types of furnace from the metallurgical aspect, economic considerations, practical and local considerations, and from the aspect of personnel and welfare. In "Magnesium (Elektron) Casting Alloys, Engineering and Foundry Properties," L. J. C. van Ewyk, Holland, said that the salient good points of electron alloys are: High strength-to-weight ratio; good castability; the high qualities of wrought products, and the good machinability.

Of three papers on general subjects, one was the exchange paper from the Institute of British Foundrymen: "Developments in Blast Furnace Efficiency," by T. P. Colclough, D. Sc. (London). The paper describes the latest progress made in the operation of blast furnaces for the production of foundry iron.

The exchange paper contributed by the Association Technique de Fonderie, Paris, gave an historical record of "The Evolution of Cast Irons in the Past Twenty-Five Years," and was prepared by Marcel Ballay, president of the French association, and Raymond Chavy. Dr. D. J. da Silva and Dr. J. J. Verzyl, of Raadgevend Bureau Ir. B. W. Berenshot, Amsterdam, contributed a paper describing methods of accelerated training of foundry foremen and workers, which originated in Switzerland and have been developed and carried out in Holland the last three years. Instruction is given to small groups of eight to ten trainees by specialized trainers in a separate training department during a period of 12 weeks. The authors show that very satisfactory results have been obtained by the application of these methods.

Meetings of Interest to Foundrymen

Nov. 2-4—Industrial Management Society, annual time and motion study clinic, Sheraton Hotel, Chicago

Nov. 2-5—Meehanite Metal Institute, annual meeting, Hotel Carter, Cleveland

Nov. 3-4—Metals Casting Conference, Purdue University, West Lafayette, Ind.

Nov. 4—Malleable Founders' Society, eastern sectional meeting, Commodore Hotel, New York

Nov. 7-8—Annual Pittsburgh Conference on X-ray and Electron Diffraction, Mellon Institute of Industrial Research, Pittsburgh

Nov. 10-11 — National Foundry Association, annual meeting, Waldorf-Astoria Hotel, New York

Nov. 25-26—New York Regional Conference, sponsored by New York AFS chapters, Syracuse University, Syracuse, N. Y.

Nov. 28-Dec. 3—Chemical Industries exposition, Grand Central Palace, New York

Nov. 30-Dec. 2—Society for Experimental Stress Analysis, annual meeting, Hotel New Yorker, New York.

Dec. 9—Malleable Founders' Society, western sectional meeting, Drake Hotel, Chicago

1950

(Tentative Schedule)

Jan. 16-19—Plant Maintenance Show and Conference, Public Auditorium, Cleveland

Jan. 20 — Malleable Founders' Society, semiannual meeting, Hotel Cleveland, Cleveland

Feb. 9-10—Birmingham Regional Foundry Conference, sponsored by Birmingham AFS chapter.

Feb. 24—Malleable Founders' Society, western sectional meeting, Drake Hotel, Chicago

Feb. 27-Mar. 3—American Society for Testing Materials, annual committee week, William Penn Hotel, Pittsburgh

Mar. 3—Malleable Founders' Society, eastern sectional meeting, Commodore Hotel, New York

Mar. 10-11 — Ohio Regional Conference, Cincinnati, sponsored by Ohio AFS Chapters and University of Cincinnati.

Mar. 21-22—Steel Founders' Society of America, annual meeting, Edgewater Beach Hotel, Chicago

Mar. 24—Malleable Founders' Society, western sectional meeting, Drake Hotel, Chicago

Apr. 28—Malleable Founders' Society, western sectional meeting, Drake Hotel, Chicago

May 8-12—American Foundrymen's Society, annual convention and exhibition, Cleveland

May 19—Malleable Founders' Society, eastern sectional meeting, Commodore Hotel, New York

May 26—Malleable Founders' Society, western sectional meeting, Drake Hotel, Chicago

June 1-3—Electric Metal Makers Guild, annual meeting, Shawnee Hotel, Springfield, O.

June 22-23—Malleable Founders' Society, annual meeting, The Homestead, Hot Springs, Va.

June 26-30—American Society for Testing Materials, annual meeting and exhibition, Haddon Hall, Atlantic City, N. J.

July 28—Malleable Founders' Society, western sectional meeting, Drake Hotel, Chicago

Oct. 12-13—Foundry Equipment Manufacturers' Association, annual meeting, Greenbrier Hotel, White Sulphur Springs, W. Va.

Oct. 19-20—Gray Iron Founders' Society, annual meeting, Netherland Plaza Hotel, Cincinnati

Nov. 8-10 — National Foundry Association, annual meeting, Edgewater Beach Hotel, Chicago

"We 'cast' ou

Fred Middleton, Vice President of Production Foundries Division of Jackson Industries, Inc., Birmingham, Alabama, is typical of alert, aggressive executives with faith in the future of American foundries.

PRODUCTION FOUNDRIES DIVISION
JACKSON INDUSTRIES INCORPORATED
BIRMINGHAM 1, ALABAMA

P. O. DRAWER 581
10TH AVE. AT 36TH ST., NO
TEL. 4-8821

Mr. Leon Miller, Sales Manager
Machine Division
The Osborn Manufacturing Company
5401 Hamilton Avenue
Cleveland 14, Ohio

Dear Mr. Miller:

Seldom do I feel the urge—or find the time—to write a letter other than one pertaining to some aspect of our business. This letter is the exception ...the result of an increasing awareness of the vital part Osborn Moulding Equipment plays in the effective operation of our company.

In view of the fact our foundry is completely equipped with your moulding machines that continue to serve us faithfully, year after year, with a minimum of maintenance in the production of uniform, high quality castings, we feel called upon to "cast" our vote for Osborn—in writing. Osborn always lives up to its "campaign promises"—all ways!

Sincerely yours,

Fred Middleton

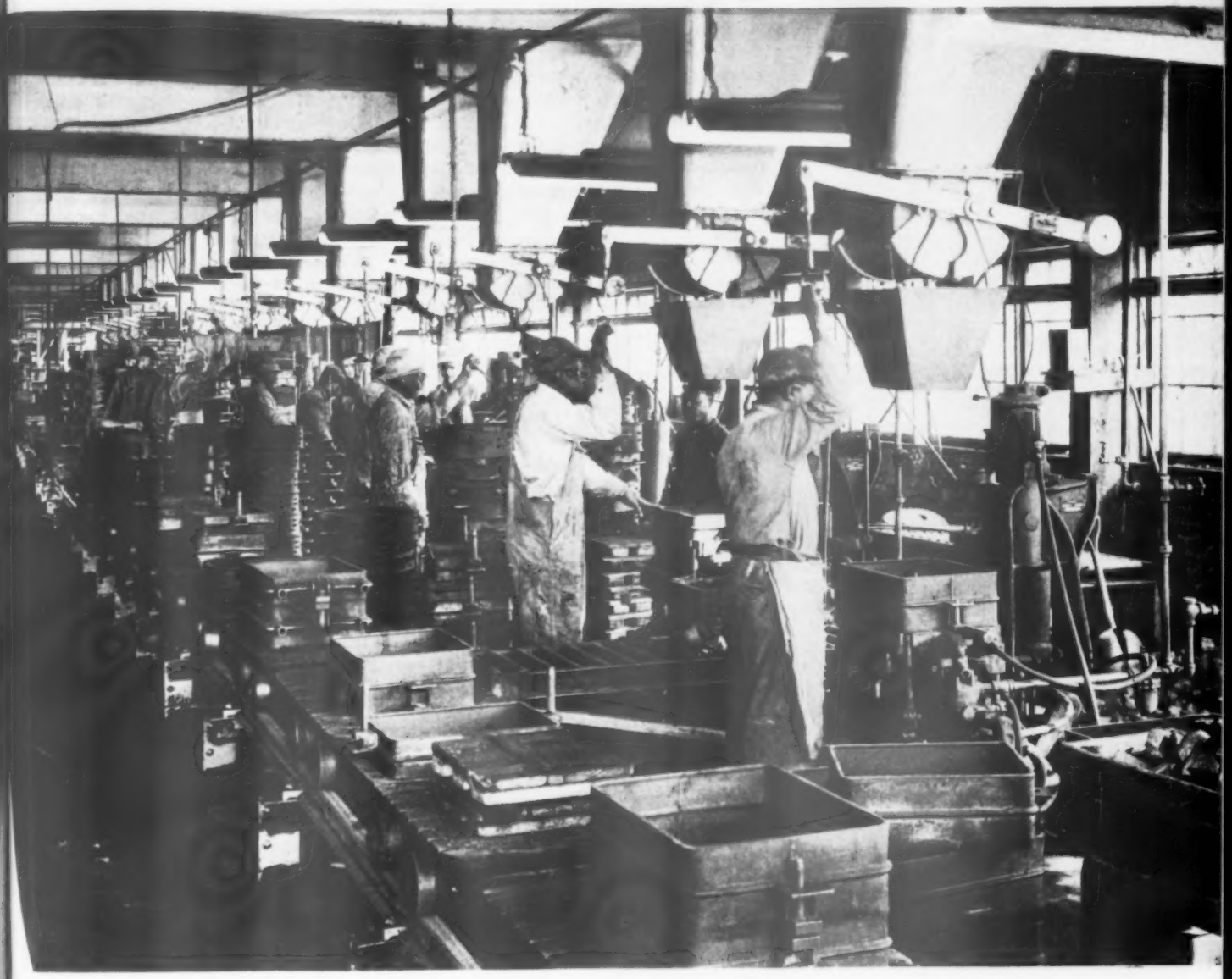
Fred Middleton, Vice President
Production Foundries Division
Jackson Industries, Incorporated

FM/es

This is one of many letters indicative of the Foundry Industries' keen awareness of the many contributions Osborn has made in its customers' interests. Osborn's Research Program is one of continuing development and improvement of its complete line of Moulding Machines and Core Blowers.

THE OSBORN MANUFACTURING COMPANY
5401 Hamilton Avenue Cleveland, Ohio

vote for *Osborn!*"



HERE you see one of the efficient production lines of Production Foundries Division of Jackson Industries, Inc., with its battery of Osborn Jolt Squeeze Stripper Pin Lift Moulding Machines. The unfailing dependability and speed of Osborn Moulding Machines insure maximum production of automotive and a variety of medium-size castings at a minimum moulding cost.

If you are faced with a high "break even" point in foundry operations, due to outmoded moulding methods and machinery, contact us today. A trained Sales Engineer will analyze your requirements and submit constructive recommendations—without obligation.

OSBORN®

MOULDING MACHINES CORE BLOWING MACHINES

MANUFACTURERS' ASSOCIATION, INC. FOUNDRY EQUIPMENT

California Public School Offers

FOUNDRY PRACTICE COURSE

PASADENA, Calif., nationally known for its Tournament of Roses parade and Rose Bowl football games on New Year's day each year, has also the only public school system in California offering a four-hour daily vocational course in foundry practice.

The Pacific coast states, with 562 foundries, feel the need for skilled and technically trained foundry workers the same as other foundry areas.

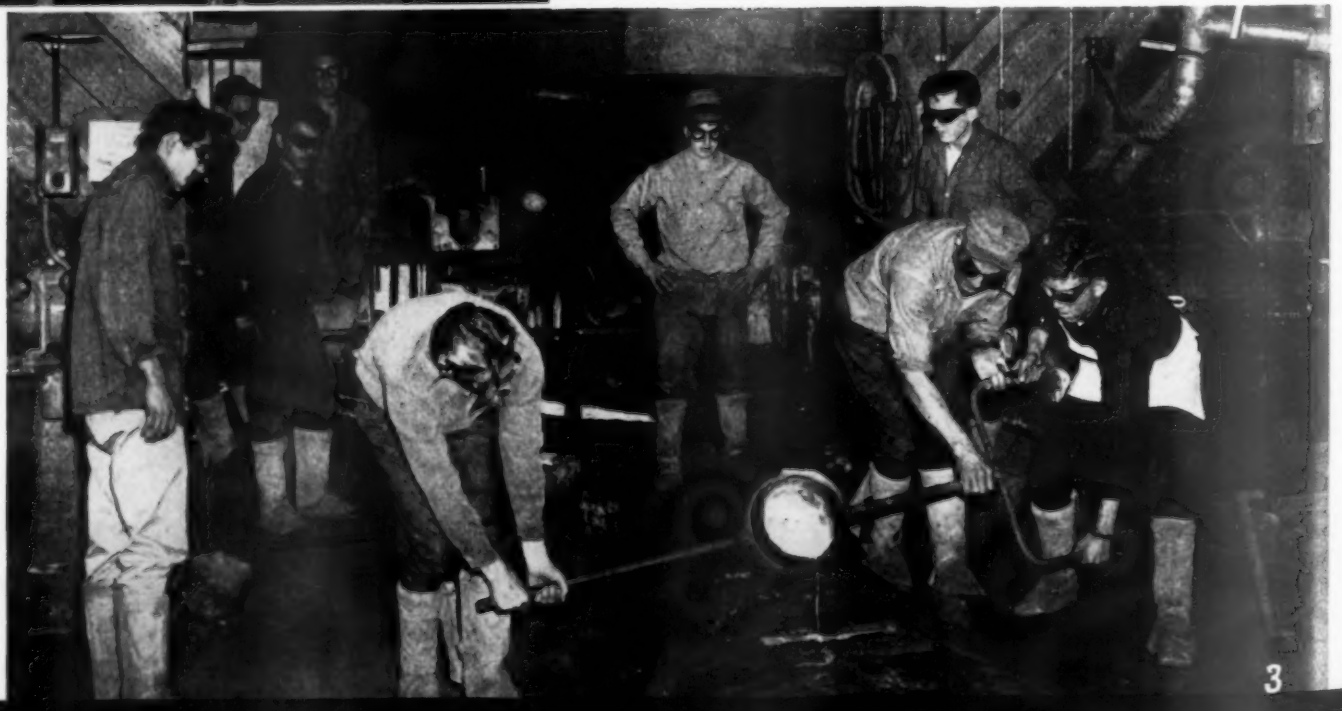
This foundry course was first offered in the fall semester of 1941, and has been continued since then, except for two and one-half years during World War II when the enrollment of men students was so low that it was necessary to discontinue several of the vocational courses. At that time the foundry was located at the Garfield shops about 2 miles from both of the junior colleges in the Pasadena system. During the war a temporary building 22 x 72 ft was erected on the Pasadena City College Campus and the foundry moved to this new location.

The shop is equipped with a cupola lined to 24 inches inside diameter. It is 35 feet from hearth-plate to spark arrester and was lined throughout by students. Small cupolas present a problem when being lined with firebrick, because of the small dimensions and the necessity of having men and materials in the restricted area. However, in this cupola the staging problem was solved by placing a 1 x 3 board 26 inches long so that the ends extended into the lining on opposite sides and at about every 2-foot intervals. As the lining progressed upward these boards made a good ladder to reach the working level. A 1 x 12 placed across two 1 x 3s made a good platform for the student while laying the brick. When the job was completed the boards were removed one at a time by sawing about 5 inches out of the center of each and

Fig. 1—W. L. Todd, instructor, helps pour a two-up

Fig. 2—Tapping the cupola. Left to right are Harold Sachs, Ray Hopping and W. L. Todd

Fig. 3—A small first tap is to heat the ladles and is then pigged. Left to right are Shiji Mayeda, Harold Sachs, Paul Willalobos, Ray Hopping, Arthur Sandstrom, Stanley Beahm, Robert Decker, W. L. Todd and Paul Repath



pulling the ends from the lining. The holes in the lining were filled with small pieces of firebrick and ganister.

This furnace is capable of melting 2½ tons an hour, but due to space restrictions and learning factors it is necessary to slow the melting down to about 1 ton an hour. The average heat is about 2400 pounds.

Practically all of the molding is from loose patterns. A fairly large variety of patterns of bench and side-floor size are available, and all good castings are used in the machine shops of the two colleges and the several junior high schools in the system.

A blower direct connected to a 15-hp motor furnishes the blast for the cupola.

Iron and coke charges are raised to the charging floor on a 1000-pound capacity hydraulic elevator.

A tilting furnace holding a No. 60 crucible and fired with natural gas is used for melting brass.

Aluminum alloys are melted in a homemade furnace using an iron pot. Coke is used as fuel and the blast is supplied by a small blower.

A 24 x 48-inch tumbling barrel is used to clean most of the castings. Pieces likely to be broken in the barrel are cleaned in a sandblast cabinet.

School Has Physical Laboratory

Other equipment includes a jolt-squeeze molding machine, pedestal grinder, stock core machine, four-shelf core oven, air gun, air rammer, and portable grinder.

A well equipped physical testing laboratory is available and is used one semester out of every four. Here are located a 200,000-pound capacity tensile, compression, and transverse testing machine; hardness testing apparatus; two bench microscopes and a metalloscope; and grinding and polishing equipment for the preparation of metallurgical samples. Several pieces of sand testing equipment have been purchased but are not being used at present on account of lack of space close to foundry operations.

Instruction in the shop includes squeezer molding, bench molding, floor molding, coremaking and cupola operation. Class room instruction is given in: Foundry mathematics, foundry science, blueprint reading, theory of cupola operation, foundry metallurgy, and elementary metallography.

William Lewis Todd is the instructor. A graduate of Wentworth Institute, Boston, a trade school, he knows first hand what a trade course can accomplish. Twenty-five years in industry as molder, coremaker, cupola tender, and foreman contribute very definitely toward making this course a true trade program.

Howard Marvin is the director of vocational education in the Pasadena city schools.

Segregation
In Small Steel Castings

(*Continued from page 77*)

small neck was attached while the other casting was sound, but severe carbon segregation is shown by the dark etched areas in both cases. Spectrographic analyses of this area of the solid casting again indicates some alloy segregation.

	Segregate	Base Metal
Manganese	0.80%	0.75%
Silicon	0.40%	0.45%
Chromium	1.12%	1.01%
Molybdenum ..	0.62%	0.55%
Nickel	0.32%	0.30%

The carbon content obtained on drillings from the solid casting was 0.25 per cent in the base metal and 0.44 per cent in the segregated area. The plot of a hardness survey taken across a section of the casting just below the neck is shown in Fig. 11.

In the two castings of Fig. 7, the cores were made of oil sand, and a carbon-free pipe eliminator was used on the risers. There was the remote possibility that the oil binders from the Washburn core, being carbonaceous, might have caused an increase in carbon content of the metal. In order to eliminate this possibility, similar castings were made with cement knock-off riser cores. The cores contained only sand, cement and water, with no carbonaceous material present and no pipe eliminator of any kind applied to the risers. Nevertheless, segregation still persisted with the same degree of severity.

Fig. 9 shows the carbon contents as obtained on drillings at various positions on a test casting and its riser. Although severe segregation is shown in this manner, the maximum amount of segregation may not be shown because of the manner in which the samples were obtained. Each value of carbon content shown in this figure is the average of the small drilled volume which, when taken from a segregated area, undoubtedly includes some lower carbon base metal.

Theory of Formation of Segregation—In the casting of Fig. 9 it is noted that the carbon content of the lower part of the riser and of the restricted contact contain less carbon than the base metal near the casting surface. However, the riser shown in Fig. 10 which covered the entire casting shows a more uniform carbon content throughout. Extensive analyses of several other risers taken from castings in which segregation occurred also indicate negative segregation. This condition was found in both top and side feeding risers.

It is believed that this occurrence can be explained in the following manner. According to the constitution diagrams, alloys freeze selectively under equilibrium conditions. The higher melting point constituent freezes first, leaving the remaining liquid deficient in this constituent. In practice the solidification rate of alloys may be sufficiently slow so that segregation is present after the alloy has solidified as is typified by the cored and dendritic structures of many alloys.

Presents Solidification Theory

In steel, the low-carbon dendrites solidify first and as solidification progresses, the remaining liquid becomes enriched in carbon. At the surface of a casting, cooling may be so rapid that there is insufficient time for selective solidification to occur to a very great extent, and the metal will be comparatively homogeneous. At the interior of a casting, the temperature gradients tend to level off causing the rate of solidification to be retarded, and it is probable that within the solidification range there exists a solidified dendritic lattice within which there is high-carbon liquid metal.

A knock-off riser contact, because of its low rate of heat loss, will solidify similar to the central zone of a much larger section. It is believed that this particular type of segregation occurs in castings because, during the freezing process, the riser contact is in a more advanced state of solidification than the casting. The dendritic lattice with its entrapped liquid extends across the contact while there is still a demand for feed metal within the casting. When further solidification occurs within the casting, a vacuum forms which causes the high-carbon interdendritic metal in the contact to flow into the casting, thus raising the carbon content.

In the riser, the existing liquid has also become slightly impoverished in iron and enriched in carbon. This liquid flows into the dendritic structure of the riser contact and also into

the casting if additional metal is needed there. The lower part of the riser and the riser contact contain less carbon than the base metal because the liquid metal flowing through these areas during the last stages of feeding is continually losing some of its low-carbon constituent by the process of selective solidification. Thus the neck and lower extremity of the riser, when solidification is complete, consist of an abnormally high percentage of the low-carbon constituent.

Segregated zones of this type may thus be considered as an intermeidate condition between sound, comparatively homogeneous metal and shrinkage cavities. Segregated areas are warnings of potential shrinkage and in many cases segregation and shrinkage exist together.

(To be concluded next month)

Reference

1. Clark, K. L. and Kowall, N., "Hardness Measurement as a Rapid Means of Determining Carbon Content of Carbon and Low-Alloy Steels," *Metals Technology*, Vol. 11, No. 1, Jan. 1944.

Note: This article published with permission of the U. S. Navy Department without endorsement of statements or opinions of the writer.

OBITUARY

FREDERICK L. WOLF, 64, nationally known metallurgist, died Sept. 27 at University Hospital, Ann Arbor, Mich. A native of Elmore, O., Mr. Wolf was graduated from University of Michigan in 1908. From 1911 to 1941 he was associated

FREDERICK L. WOLF

with Ohio Brass Co., Mansfield, as chemist, chief engineer, and technical director in charge of laboratories, research and plant control work. He was given leave of absence in 1941 to serve with War Production Board, Washington, and became deputy director of the Mica-Graphite Division, Minerals Bureau. Following the war he became vice president, Ross-Tacony Crucible Co., Philadelphia and retired in 1945. He returned to Mansfield after serving as chief of a U. S. government inspection group of chemists and metallurgists who toured Germany studying nonferrous metals. Mr. Wolf, an honorary life member of the American Foundrymen's Society, was awarded the John Penton gold medal by that society in 1941 for his outstanding achievement in the nonferrous metal industry. He was also a member of the American Society of Metals, British Institute of Metals, American Institute of Metallurgical and Mining Engineers and American Society for Testing Materials.

* * *

Benjamin F. Lambert, 61, since 1927 manager of coke sales for the Diamond Alkali Co., Cleveland, died there Sept. 21. His long association with the industry made him well known among foundrymen. Mr. Lambert was an active member of the Northeastern Ohio Chapter of the American Foundrymen's Society, and served as its secretary in 1940-41.

* * *

L. G. Sullivan, vice president, Atlas Steel Casting Co., Buffalo, died suddenly Oct. 2, at White Sulphur Springs, W. Va., where he had gone to attend the fall meeting of the Steel Founder's Society of America. Mr. Sullivan had served as manager of the company's New York office for 14 years prior to being named a vice president in 1935.

* * *

Harry J. Zottman, 57, associated with the steel foundry industry for 40 years, died Aug. 19. Mr. Zottman joined Alloy Steel & Metals Co. in 1938, following four years with Warman Steel Casting Co., both of Los-Angeles. Prior to that he had been connected with National Brake & Electric Co., Milwaukee.

* * *

James H. Shenton, foundry executive, died Sept. 11, in Nashua, N. H. Mr. Shenton, a native of Malden, Mass., was associated for many years with his father in the William Highton & Son foundry, and later operated the Bronze Craft Corp., Nashua, N.H.

* * *

James B. Crowley, 78, secretary of the Pioneer Foundry Co., Jackson, Mich., died Sept. 14. Mr. Crowley had served as secretary of the company since its organization in 1905.

* * *

Thomas H. Terry, 60, for 27 years a sales representative of the Federal Foundry Supply Co., Cleveland, died Sept. 13. Mr. Terry, a native of Cleveland, joined the company in 1918 and served as Cleveland representative until July, 1945, when illness forced his retirement.

* * *

Douglas B. Hobbs, 49, in charge of educational and technical information activities of the public relations and advertising department, Aluminum Co. of America, Pittsburgh, died Oct.

DOUGLAS B. HOBBS

12 while attending a convention in New York. Mr. Hobbs had been associated with the Aluminum Co. of America since 1923, joining the organization as a research metallurgist in the Aluminum Research Laboratories at Cleveland. A year later he was transferred to the metallurgical division of the company's Cleveland works and in 1929 to the public relations department in Pittsburgh. He was a graduate of the University of the South, Sewanee, Tenn., and in addition did graduate work at Lehigh University, Bethlehem, Pa.

* * *

Henry W. Priep, 71, foundry executive, died Sept. 22 in St. Louis. Mr. Priep was president of Tower Grove Foundry Division, which he founded in 1904, and of its affiliate, Laclede Stoker Co., both of St. Louis.

* * *

Warren G. Jones, 33, vice president, W. A. Jones Foundry & Machine Co., Chicago, died Sept. 16, following a brief illness. Mr. Jones was active in committee work of the American Gear Manufacturers' Association.

* * *

Howard H. Ganson, 64, former sales manager, Strong Steel Foundry Co., Buffalo, died Sept. 23.

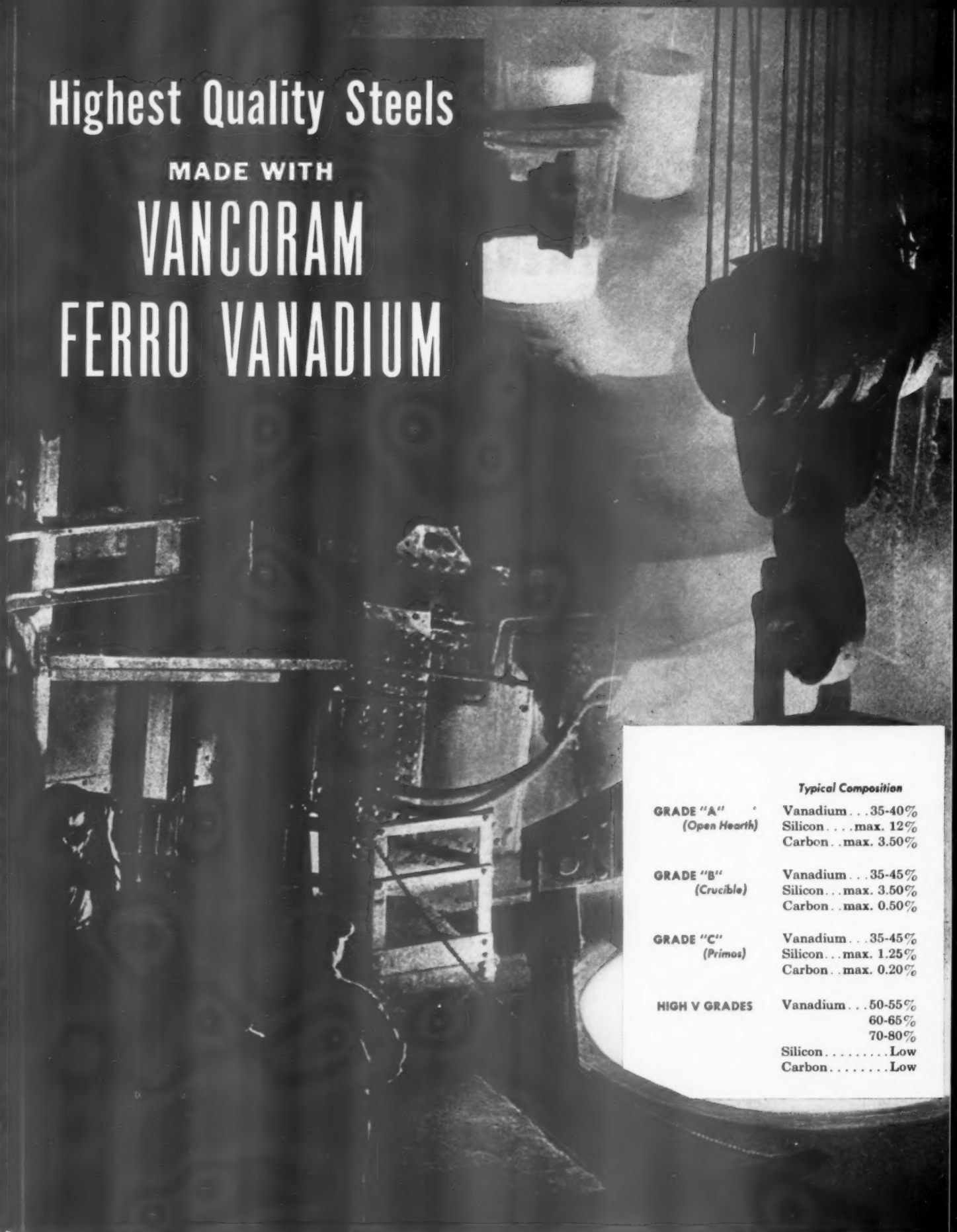
* * *

Clarence B. Martin, assistant sales manager, St. Louis Malleable Casting Co., St. Louis, died Sept. 26.

Highest Quality Steels

MADE WITH

VANCORAM FERRO VANADIUM



	Typical Composition
GRADE "A" (Open Hearth)	Vanadium . . . 35-40% Silicon . . . . max. 12% Carbon . . max. 3.50%
GRADE "B" (Crucible)	Vanadium . . . 35-45% Silicon . . . max. 3.50% Carbon . . max. 0.50%
GRADE "C" (Primos)	Vanadium . . . 35-45% Silicon . . . max. 1.25% Carbon . . max. 0.20%
HIGH V GRADES	Vanadium . . . 50-55% 60-65% 70-80% Silicon . . . . . Low Carbon . . . . . Low

VANADIUM CORPORATION OF AMERICA

420 LEXINGTON AVENUE, NEW YORK 17, N. Y. • DETROIT • CHICAGO • CLEVELAND • PITTSBURGH

MAKERS OF FERRO-ALLOY

VANCORAM

CHEMICALS AND METALS

Man-to-Man

ON THE MOLDER'S BENCH

"Overdoing It"

By RALPH L. LEE

EVERY once in a while, a close friend tells me he thinks that maybe I'm just a bit inclined to overdo things. Mother (that's my better half) makes no bones about it. I've heard her say that if she asks me to do some little chore—like hanging up a picture—if she doesn't look out, the first thing she knows she'll find me mixing up a batch of plaster for filling up all the abandoned picture-nail-holes all over the house, and maybe later all wrapped up trying to invent a new method for putting holes in walls without cracking the plaster (which I've been working on, by the way).

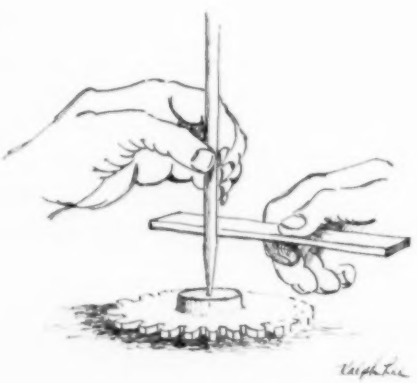
Along this line, I remember one time as an apprentice, I got all excited watching a toolmaker putting rows of shiny little spots all over the lid of a drill jig he was finishing up. He was using a piece of wood dowel rod in the drill press with some emery and oil. When I told my Dad about it and how anxious I was to try it myself he just about blew his top. "Of all the blankety-blank wastes of time that tops the list," he ranted. "What earthly good can it possibly do, either to the jig or the pieces to be drilled?"

Then he gave me a lecture. He told me that overdoing anything was just as bad as underdoing it. He said that split hair fits on parts that would be better off loose was just like spots on drill jig lids. Then turning his lesson upside down to give me his inevitable "but on the other hand," he made the point that it was just as easy to get into the habit of cutting on the line as it was to moleander around a sixteenth from it. There was only one Pop Lee.

This lecture came back to me on a foundry visit down South just before my vacation. My old uncle who owns a factory in this town was having a bit of casting trouble, so he and I went over to see the folks who were doing some of his work. I'm afraid I left Uncle Werd and the boss in the lurch when I met one of the few remaining specimens of those rare old, all-around journeymen molders. He and I really got together. He showed me some gray iron castings he had made which I swear looked as though they had been die cast or lost waxed. He insisted on my feeling the little pile of facing he had used, but he wouldn't tell me what was in the pile, for he said that he'd been developing that mix over the last twenty years. I guess he considered it one of his trade secrets.

Then with a few flourishes, slightly on the show-off side, he rammed up a mold (it was one of my uncles parts) to demonstrate his secret formula. When he got ready to draw the pattern he stopped and said, "Now I want you to watch this—there are molders all over the country who think they have to rap the daylights out of every pattern they mold. Here!" Then with just a few very light taps (and it was a good-size pattern too) up came the pattern, just as steady as a rock, leaving behind it one of the smoothest and cleanest molds I have ever seen.

Remembering my own nerve-racking struggles I said, "Boy! that's skill if I ever saw any." "Well, I wouldn't say that," he sparkled, "but Doc, it ain't as tricky as it seems. To my way of thinking it's actually easier to draw a pattern if you don't overrap it. I think it's the way you were brought up—your idea as to the rapping it takes or the habit you get into."



I haven't been able to draw a pattern since without feeling my new friend behind me. Just last night I was surprised to find what little rapping I could get by with. Now I suppose that, true to form, I'll be overdoing this underrapping thing and making a mountain out of a molehill. For I must say that I've seen some patterns on my travels that had to be literally beaten out of the sand, and I guess our patternmaker friends might have something to do with the amount of rapping it takes.

Well anyway, I'm probably not the only one. Maybe it's human nature to feel that if something's good, more of it is better. I expect that's why we have so many drives and campaigns. Like one outfit I heard of; after licking a particularly tough scrap-producing job it put on an organization-wide inspection-tightening campaign. They got the inspection so darned tight that everybody in the place was afraid to do anything at all. It almost closed down the shop.

There are so many things we've got to watch in the foundry I guess we can't go hog wild on any one of them at any one time. It would take too long to make the circuit. Moderation in all things, even if they're good, just about fits the bill, I imagine.

I'm going to break myself of the overdoing habit if I can. In fact, I think I'll make a list of all my habits and check 'em. I'll bet that I find

(*Concluded on page* 144)

LESS HORSEPOWER REQUIRED with SIMPSON MIXERS

Obviously, the lower horsepower required to do an efficient, thorough sand preparing job, the lower the cost—for power and for maintenance. In Simpson Intensive Mixers, you are assured of the lowest horsepower per ton of properly prepared sand . . . made possible by these engineering features:

In the Simpson, sand lies upon a stationary pan, power being required only for working the sand—by rolling the mullers over the sand which the plows have windrowed into the muller path.

Second, the well-balanced design and precision workmanship of all moving parts reduces friction, which reduces heat, thus requires less horsepower.

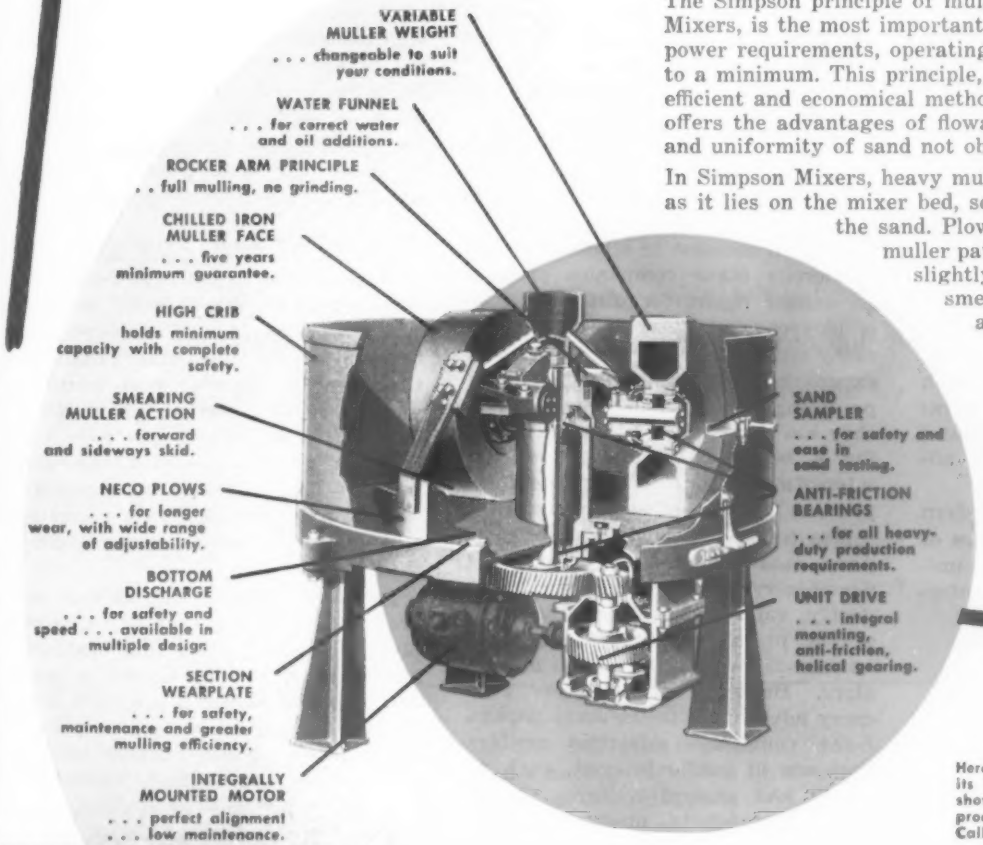
Listed below are some of the advanced engineering features responsible for the dependable, long-life operation of Simpson Mixers in all classes of foundries, on the toughest sand preparation problems.

The Simpson Principle of Mulling

The Simpson principle of mulling, as effected in Simpson Mixers, is the most important factor in holding horsepower requirements, operating costs, and maintenance to a minimum. This principle, which provides the most efficient and economical method of preparing molding sand, offers the advantages of flowability, toughness, elasticity and uniformity of sand not obtained by any other method.

In Simpson Mixers, heavy muller wheels roll over the sand as it lies on the mixer bed, squeezing and kneading the sand. Plows then repile the sand in the muller path. Because the mullers are set slightly off the true radius, the smearing action is intensified . . . and only the Simpson employs this true mulling principle.

In the Simpson design, the mullers never approach closer to the bedplate than the diameter of at least ten sand grains . . . thus, there is no possibility of any crushing or grinding action.


VARIABLE MULLER WEIGHT
. . . changeable to suit your conditions.
WATER FUNNEL
. . . for correct water and oil additions.
ROCKER ARM PRINCIPLE
. . full mulling, no grinding.
CHILLED IRON MULLER FACE
. . . five years minimum guarantee.
HIGH CRIB
holds minimum capacity with complete safety.
SMEARING MULLER ACTION
. . . forward and sideways skid.
NECO PLOWS
. . . for longer wear, with wide range of adjustability.
BOTTOM DISCHARGE
. . . for safety and speed . . . available in multiple design
SECTION WEARPLATE
. . . for safety, maintenance and greater mulling efficiency.
INTEGRALLY MOUNTED MOTOR
. . . perfect alignment . . . low maintenance.
SAND SAMPLER
. . . for safety and ease in sand testing.
ANTI-FRICTION BEARINGS
. . . for all heavy-duty production requirements.
UNIT DRIVE
. . . integral mounting, anti-friction, helical gearing.

Here, then, is *controlled* sand mixing at its best . . . let a National Engineer show you how to cut costs and improve product quality with Simpson Mixers. Call or write for complete details.

SIMPSON Intensive MIXERS

NATIONAL *Engineering Company*

608 Machinery Hall Bldg. • Chicago 6, Illinois

Manufacturers and Selling Agents for Continental European Countries—The George Fischer Steel & Iron Works, Schaffhausen, Switzerland. For the British Possessions, Excluding Canada and Australia—August's Limited, Halifax, England. For Canada—Dominion Engineering Co., Ltd., Montreal, Canada. For Australia and New Zealand—Gibson, Battle & Co., Pty., Ltd. Sydney, Australia

(*Concluded from page* 142)

some pretty well out of line; one or two I know right now are dillers. Maybe I'll find I've gotten into the habit of everdoing it on coke, too much gas in the furnace, too long a time in the tumbling mill, too much bond in the core sand, too many lights burning, too many leaks in the air line, too many long distance calls, too much talk and not enough doing.

It could be that I might find myself even overdoing the job of cutting out overdoing jobs.

New York Conference Speakers Announced

Program for the New York State Regional Foundry Conference to be held at Syracuse University, Syracuse, N. Y., Nov. 25-26, will include six technical sessions, in addition to an opening session, two luncheon meetings and a dinner.

A general session devoted to nodular iron will have J. C. H. Stearns Jr., Dow Chemical Co., as its speaker. James H. Lansing, Malleable Founders' Society, will address a malleable iron session on "When To Use and Advantages of Malleable Iron." Simultaneous sessions on nonferrous metals and steel will have B. A. Miller, Baldwin Locomotive Co., and William Ball Jr., R. Lavin & Sons Inc., respectively, as speakers.

Harry W. Dietert will speak at one general session on the subject of sand, while a general session on motion study has Prof. B. H. Norem, Syracuse University, as the scheduled speaker. Dr. T. V. Smith will address the conference dinner.

The Central, Eastern and Western New York and Rochester chapters of the AFS in co-operation with the university are sponsoring the conference.

Issues Booklets

American Management Association, 330 West 42nd St., New York 18, has issued a series of booklets dealing with the following subjects: Advances in insurance coverage—accident prevention and control, executive personality and job success, personnel functions and the line organization, appraising and training office supervisors, worker morale and productivity, organization controls and executive compensation, building quality into manpower, management's role in industrial mobilization, and building worker interest in production problems.

Public Relations

(*Continued from page* 73)

your company make talks to students at local schools, before PTA groups and service organizations in which the functioning of your industry is explained? Here again foundry management is not grasping the opportunity to build a better understanding of the company's relationship to the community, since only 28.5 per cent answered "yes" to this question. Talks before students pave the way for possible employment when students finish their schooling. Guidance teachers are eager to have information on the various job opportunities in the community and usually will welcome talks that acquaint students with an industry.

On the other hand, talks or presentations before service clubs not only build community relations but quite frequently have a sales slant that should not be neglected.

Has your company prepared booklets or other printed information explaining your company, products, and its importance to the community? The replies were disappointing since only 14.4 per cent have prepared such booklets for distribution to local people and on occasion to school children. Numerous other companies prepare an annual report for distribution to employees and this is supplied to many citizens of the community. The experience of a number of foundries preparing such booklets indicates that they are quite valuable both in building a better understanding and in interesting young people in the company as a source of employment.

Has top management of your company made friends with the local newspaper people? Management evidently values the acquaintanceship of the press because 74.5 per cent answered the question in the affirmative. However, only 21 per cent carry advertising in the local papers. Some companies advertise matters that are of public interest, such as safety and general welfare. Others illustrate products, production techniques and point to the application of the product in the general economy. Numerous comments stated that the product was not marketed locally, therefore no advertising was done.

Since numerous experts in the public relations field believe that local publicity is an excellent means of improving the standing of the plant in the community, several questions were asked concerning the type of information supplied newspapers.

"Do you supply newspapers with news concerning the activities of your company?" Fifty-two per cent replied in the affirmative. Of those replying, 48.1 per cent stated that they kept the local newspapers informed of company personnel changes. Only 20.2 per cent limited such information to news releases on top management, the remainder of those supplying such information include all employees from president down. Only 16 per cent reported that they supply newspapers with human interest stories on employees.

Has top management made friends with the local radio people? This new form of communication is considered sufficiently important by 38.5 per cent of those replying to justify acquaintanceship with those operating the radio station. Although the number of radio stations has increased greatly in recent years, a number of foundries reported no radio station in their community. Slightly less than 1 per cent of the replies show a company-sponsored radio program, or the use of radio to make spot announcements. About the same percentage provide radio stations with releases on company and personnel news. Reports from those who have used radio indicate considerable enthusiasm for that public relations tool.

Employ Radio Programs

Comments revealed that one company sponsors a half-hour program featuring interviews of employees on the job. Another firm stated the local Chamber of Commerce sponsors a weekly radio program about local industries and that the foundry had been selected for one of the programs. The story of the company was told by its employees. Another company sponsors a network commentator locally.

Prizes for community affairs are provided by 46 per cent of those replying. While contributions to local affairs might be considered a part of the public relations program, only 37.5 per cent of those replying permit the public relations man to have a voice in deciding on such requests.

About 1 per cent of the foundries reported a company glee club which makes public appearances. One firm stated the superintendent of the foundry was the leader of an outstanding local glee club. If this question had been broadened to include all types of singing groups, a larger percentage of participation probably would have been indicated.

Company-sponsored athletic teams seem to be in considerable favor

(*Concluded on page* 146)

GET ALL FOUR *with* HYDRO-BLAST

CLEAN CASTINGS CLEAN SAND CLEAN AIR

...*and* A GOOD, CLEAN PROFIT

- **clean castings**

  This is the primary function of Hydro-Blast—to clean castings. It does so, exceedingly well; does it efficiently, quickly; speeding production and cutting cleaning costs, achieving handsome savings that can quickly repay the whole cost of installation.

- **clean sand**

  The washing action of Hydro-Blast *cleans sand*—always improves it, and in a great many instances makes it *good as new.*

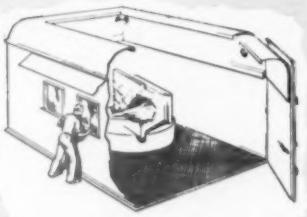
  Most Hydro-Blast users report substantial savings in sand cost as an added factor in quickly paying for the Hydro-Blast.

- **clean air**

  Here is a vital by-product of extraordinary value: within half an hour after Hydro-Blast operation is begun, the dust concentration in the air within 50 feet of the Hydro-Blast is lessened by 50 percent.

- **and a good, clean profit**

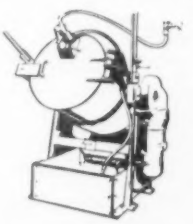
  You can get all four. How to get them is worth investigating—still more richly worth enjoying. There's a simple way to start—ask us.



OPERATOR OUTSIDE—for cleaning heavy deeply cored castings by means of high capacity equipment, mechanically mounted.

OPERATOR INSIDE—an efficient low cost method of cleaning deeply cored castings; for production and custom foundries.

HYDRO-BLAST CABINET—excellent for cleaning small, intricately cored castings requiring special attention.



HYDRO-BLAST BARREL—a wet tumbling process, highly effective and economical for cleaning many small castings.

FOREIGN REPRESENTATIVES

ENGLAND—Pneulec Limited, Licensee, Smethwick (near Birmingham) England
FRANCE AND SWITZERLAND—R. Dureuil, 4 Square Du Graisivaudan, Paris 17, France
FINLAND—Pneulec Limited, Licensee, Smethwick (near Birmingham) England
BELGIUM—Charles Monseur, 195 Rue Saint Leonard, Liege, Belgium
NORWAY, SWEDEN, DENMARK—Pneulec Limited, Licensee, Smethwick (near Birmingham) England

HYDRO-BLAST

Chicago 47, Illinois

2550 NORTH WESTERN AVENUE

(*Concluded from page* 144)

While 56 per cent reported that the company sponsored teams to compete with other teams in the community, many more indicated an athletic program confined entirely within the company.

Several conclusions might be drawn from the results of this study.

1. A sizable number of foundries are doing an excellent job in public relations. In these companies, management is making good use of the open house, newspaper publicity and direct contact with the citizens of the community in a studied effort to become better neighbors.

2. Management of too many companies is passing up an important opportunity to increase the prestige of the firm and its acceptance as a valuable addition to the economic life of the community.

3. Management of too many small companies has the mistaken idea that because of size, their organization should not try to maintain good relations with the community. Their thinking resembles that of a small foundry operator who recently wrote us as follows:

"In a recent article you had plans for a simple spark arrester. We have been unable to locate this issue, due to the fact that several of the men read the magazine and we do not get them back.

"Now we are going to have to build an arrester of some kind (quick). There happens to be a residence on one side of us, the wind always blows in its direction, and we have already paid for mattresses, quilts, several pieces of furniture and anything they wish to get rid of.

"All they have to do is to put it close to our property and very promptly we pay for it.

"Now if you could send us the issue that contained the article, perhaps we can rest in peace at night and save a lawsuit. We do right well in the foundry business, still working 6 days a week, but we are losing money on this furniture business."

This foundryman is discovering the need of an effort toward public relations. Regardless of size, any organization will find it increasingly necessary to live in harmony with its neighbors.

4. If the general public is to have a better appreciation of the importance of the foundry industry or, for that matter, of all industry to the economic life of this nation, no better place could be found to start the educational program than right at home. Management needs to study the problem of public or community relations to establish a basis for a better job and all around peace.

No discussion of public relations in the foundry industry would be complete without a brief reference to the excellent co-operative work of numerous organizations serving this industry. On the local level, important contributions to a better appreciation of the importance of foundries have been made by various chapters of the American Foundrymen's Society. These activities have taken numerous forms, including advertising the job opportunities of the industry in local papers, preparing booklets telling the foundry story for public school students, staging co-operative foundry exhibits or arranging displays of castings in local store windows, working with local school authorities to further foundry training in high schools and trade schools, and arranging foundry visits and dinners for public school teachers.

A Good Place to Work

The American Foundrymen's Society has taken the lead in pressing home the motto, "The Foundry is a good place to work." The society has been active in engineering education, and apprentice training, and has published a number of booklets which present the opportunities of the industry to youths. The apprentice contests staged annually by the society, assisted by the chapters, provide local interest and publicity for the industry. The society also has published the "Cast Metals Handbook."

The National Foundry Association provides an important public relations job in the nation's capital. The association has a special Public Relations Committee.

The Foundry Educational Foundation is doing a splendid job through co-operation with a number of engineering schools, scholarships and publicity in developing a better understanding of the industry and its products on the part of engineering school faculties, undergraduates and graduate engineers.

The National Castings Council has completed an important public relations project which has resulted in the appointment of a Foundry Industry Advisory Committee and ten advisory subcommittees to the Munitions Board.

The Gray Iron Founders' Society is furthering the gray iron industry and its products through national advertising, publicity, local management executive group activities and a monthly publication, "Gray Iron Industry News."

An important new feature of the public relations program of the Malleable Founders' Society is a technicolor sound film showing production and application of malleable castings. The society distributes six issues of "Malleable Iron Facts" each year, and has published a handbook on "American Malleable Iron." Press releases are provided on industry activities.

The Non-Ferrous Founders' Society presents information to the local level through chapter organizations and a monthly publication, "The Crucible."

The Steel Founders' Society of America has a professional public relations organization handling its work in that field. The society is using national advertising, direct mail, and a monthly publication, "Steel Foundry Facts," as a means of disseminating information. It also has published the "Steel Castings Handbook."

The Foundry Equipment Manufacturers Association has a special Public Relations Committee studying methods of assisting in the promotion of castings.

All of the trade associations prepare papers for publication and, when possible, arrange for speakers before engineering students and technical societies.

These group programs are good, but many in the foundry industry believe that more progress could be made if greater co-ordination between the individual group efforts could be developed.

Editor's Note: This paper comprised the Lumen S. Brown Lecture which was presented by the author before the ninth New England Regional Foundry Conference held at the Massachusetts Institute of Technology, Oct. 7-8.

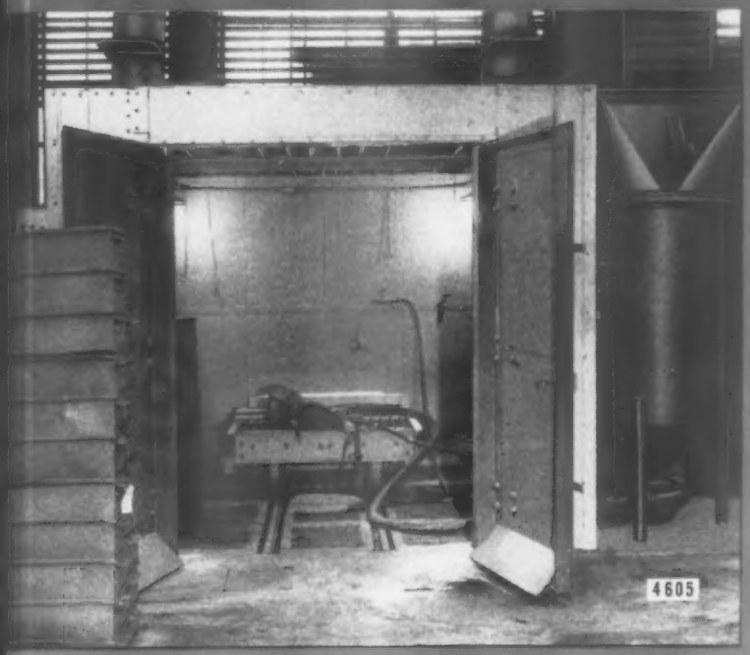
NFA Annual Meeting Program Announced

Fifty-first annual meeting of the National Foundry Association, to be held at the Waldorf-Astoria, New York, Nov. 10-11, will include a program of talks on subjects of importance to the industry, as well as reports by various of the association's committees.

Dr. Leo Wolman, director, National Bureau of Economic Research, will speak at the Thursday luncheon on "Government, Labor and Industry." Succeeding speakers will be Congressman H. H. Velde of Illinois, discussing "The Trend Toward Statism—How To Stop It," and Stevens H. Hammond, president, Whiting Corp., speaking on "Our Best Foot Forward."

Friday speakers include H. W. Heinrichs, Travelers Insurance Co., whose subject will be "Management Responsibility in Safety Activities," and Lowell B. Mason, Federal Trade Commission, on "Enterprise."

For YOUR CLEANING ROOM



Sly Blast Room (above) and Sly Dust Filter (below) at The Apex Electrical Mfg. Co., Cleveland, Ohio

SLY Armoured BLAST ROOM

This Blast Room receives the rough castings for blasting. The operator wears a Sly Helmet (shown on the car). Piping connects Room with the Sly Dust Filter.

Sly features are: excellent illumination from plenty of dust-tight lighting fixtures; over-all, down-draft ventilation from *triple* construction ceiling; safety and ease in working aided by double floor of grating and perforated plates; used abrasive automatically cleaned and returned. All these help get more production.

* An extra layer of detachable 3/16" steel wear plates to protect the walls. An extra layer of steel grating to reinforce the floor against sagging.
(Exclusive Sly Features)

SLY DUST FILTER

This Dust Filter is connected with the Sly Blast Room by piping through which the dust-laden air is exhausted. Upon reaching the Filter, all dust is removed, by filtration through cloth, and drops into a hopper from which it is drawn off into a wheelbarrow underneath.

Installed five years ago, this Sly Dust Filter, like thousands of others, has given highly satisfactory service and has cost but little to operate and maintain. By efficiently exhausing the dust-laden air from the Blast Room, it has helped to do better blasting, in greater volume.

Have you a problem involving *dust* or *blast cleaning*? We'd like to hear from you.

THE W. W. SLY MANUFACTURING CO.

4753 TRAIN AVENUE • CLEVELAND 2, OHIO

Representatives in New York · Chicago · Philadelphia · Detroit · Cincinnati
Rochester · St. Louis · Toronto · Los Angeles · Birmingham · Minneapolis

By ARTHUR H. ALLEN
Detroit Editor
THE FOUNDRY

AROUND Detroit

Parade of new automobile models to start this month . . . Ford unveils new automatic transmission developed in co-operation with the Warner Gear Division of Borg-Warner Corp.

THIS will be the month for model changes for a number of passenger car manufacturers, and a sharp slowing of the production pace can be expected. Continuation of the steel strike will make this all the more noticeable, since most plants had enough inventory for only 30-45 days production when the mills closed, which would carry them at best to mid-November. Meanwhile the position of some suppliers on steel was growing precarious, despite the efforts to reinforce steel stocks during August and September.

Pontiac will hold a press review for its 1950 models on the 10th, with public announcement scheduled the 27th. Changes will be principally in the direction of appearance, although, in addition, the displacement of the 8-cylinder engine is being raised slightly to give a little increase in power. This will require some shifts in foundry operations but they will be taken in stride.

Oldsmobile is expected to start its 1950 jobs later in the month and will have new body styles on the larger or 98 series. It is expected the General Motors "B" bodies, first introduced on the Buick Special, will be used on this Olds line, as well as on a new Cadillac model. Before the year is out Cadillac, Buick and Chevrolet will have joined the rest of the GM family in model changes for 1950, and sometime in January General Motors will again hold a special showing of its products at the Waldorf-Astoria in New York.

Ford is planning to stage an exhibit of its 1950 restyled models at the state fairgrounds in Detroit, tentative arrangements being for the event to open on the 17th. However, some doubts were being expressed over whether the impact of the steel strike might make it necessary to defer the unveiling.

The curtain has been lifted on the new Ford automatic transmission, developed jointly with the Warner Gear Division of Borg-Warner Corp., Muncie, Ind. Under development for the past four years, the unit combines a single-stage torque converter with a three-speed planetary gearbox, thus embodying features of both the Hydra-Matic and Dynaflow drives of General Motors. Harold T. Youngren, vice president and director of engineering, has been devoting most of his time to the project. It will be recalled he played a major role in the design of the Hydra-Matic transmission while he was at Oldsmobile, and later had charge of the engineering development work at Borg-Warner, before joining Ford. He is probably the No. 1 automatic transmission expert of the industry.

The torque converter part of the Ford transmission comprises three elements—an input or pump member, an output or turbo member, and an intermediate reactor or stator member through which the 2½ to 1 torque multiplication is developed. As speed increases the reactor element becomes locked to the output shaft, making a simple fluid coupling out of the torque converter. Pump and turbo members are assembled from steel stampings, the blades being mechanically locked and either welded or brazed to the shell. This is said to make for a considerable saving in cost over other types of converters which are mostly aluminum castings. The stator or reactor element is an aluminum die casting. All three components are carried in a sand cast aluminum housing, finned on the outside for dissipation of heat developed in the converter. The aluminum housing is surrounded by a cast iron outer housing, in which there are a number of ports to allow free circulation of air.

Thus no oil coolers are needed and further cost saving is effected over designs like the Buick Dynaflow and the Packard Ultramatic, both of which require oil coolers. To cool the oil in these transmissions it is necessary either to run oil lines to the radiator of the car where a suitable cooler is mounted, or to run water lines from the radiator back to the transmission.

Ford expects to put a price on its transmission of not over $150. By comparison the Dynaflow device costs $212, the Hydra-Matic from $185 to $205, and the Ultramatic $225. There have been many complaints over the high cost of automatic transmissions, but it is the feeling of automotive engineers that as long as the public wants a transmission to "do the thinking" of gearshifting, the premium will be necessary. On the other hand, buyers take the attitude that with automatic transmissions approaching more or less standard equipment, why should it be necessary to pay extra for them, any more than for the four wheels on a car?

Two planetary gear sets, with bands and multiple-disk clutches are placed back of the torque converter in the Ford transmission. Through proper hydraulic controls they give three speeds forward and one in reverse. A selector lever on the steering wheel has five positions, from left to right, parking, reverse, neutral, driving range and low range. This is a slightly different arrangement from the quadrants on other automatic drives, in that a quick shift from reverse to driving range, through the neutral position, is possible, facilitating the parking of the car and rocking it to get out of ruts or snow.

Both Ford and Borg-Warner are now tooling plants to build the complete transmission and presumably will turn them out on a 50-50 basis. First production is not expected before next summer, and the unit will be offered on both Ford and Mercury. No changes in the floor panel are necessary to accommodate the new transmission, leading to the possibility that cars already on the road might be equipped with the new unit without any extensive modifications being required.

* * *

FIRST heat was poured in the new Chrysler-Dodge camshaft foundry in Detroit Sept. 15, although there were no shafts cast then, the metal merely being pigged as it was tapped from the 10-ton electric furnace. There have been some delays in getting the elaborate sandslingers set up and functioning just the way they are intended to operate; and it will be a while before the plant is turning out shafts in any volume. Novel feature of the two electric furnaces is an arrangement for continuous charging

(*Concluded on page* 150)

FERRO-SILICON BRIQUETTES

Tepco Ferro-Silicon Briquettes, used mainly for the addition of silicon to the cupola charge of iron foundries, are most convenient because they contain a certain definite weight and can be counted instead of weighed. At the same time, the briquettes are more valuable than lump ferro-silicon because the binder in the briquettes protects the ferro-silicon as it is melted in the cupola and a greater return of silicon is obtained by that means.

Tepco Ferro-Silicon Briquettes are produced at our Chattanooga plant (formerly Southern Ferro-Alloys Company, Chattanooga, Tennessee). The 2½-pound briquettes contain one pound of silicon and the 5-pound briquettes contain two pounds of silicon.

Tepco Ferro-Silicon is also available in all sizes from lump through 150 mesh by down, packaged or in bulk—50%, 65% and 75% standard and low impurity grades. Special grades and sizes quoted on request.

PIG IRON

Diamond D Pig Iron—low-phosphorous, low-silicon, high-carbon, machine-cast—preferred for Nodular Graphitic Cast Iron and all White Iron Castings.

Rockwood Pig Iron—malleable and foundry, .15 to .30% phosphorous, machine cast, preferred for automotive, malleable and general castings.

FOUNDRY COKE

Radiant By-Product Foundry Coke—produced from properly blended coals to furnish high-grade foundry coke. Widely used by foundries in the Southern area.

Radiant Coke is also available in smaller sizes.

We will be glad to discuss with you, at any time, the numerous advantages of our plants and products.

TENNESSEE PRODUCTS & CHEMICAL CORPORATION

GENERAL OFFICES: NASHVILLE, TENNESSEE

PLANTS AT CHATTANOOGA, ROCKWOOD AND WRIGLEY, TENN.

Represented by

MILLER & CO., Chicago, St. Louis, Cincinnati; S. H. BELL CO., Pittsburgh; T. H. BENNERS & CO., Birmingham

EXPORT AGENTS: ORE & FERRO CORPORATION, 30 Broad St., New York

(*Concluded from page* 148)

of borings from a conveyor and through a water-cooled gland in the furnace roof. When the furnace is started, heavy scrap is charged so that a bath of molten metal can be obtained into which the lighter borings can be dumped. In this way the light borings can be assimilated quickly and not burned up as they might be if the attempt were made to melt them down with no bath.

* * *

PROCESS development section of General Motors is accelerating plans for various types of research equipment to be installed in the vast new GM Technical Center which is taking shape on Mound road, northeast of Detroit. One project which has been under study is a small foundry cupola which will simulate melting conditions in the various corporation production foundries. The idea was to set up a unit which would be able to supply molten iron continuously at a rate of only one ton an hour. After consulting with various equipment interests and foundry engineers, it was found to be impossible to devise a setup which would supply this small amount of metal and still have it suitable for making good castings. So some new arrangement now is being considered.

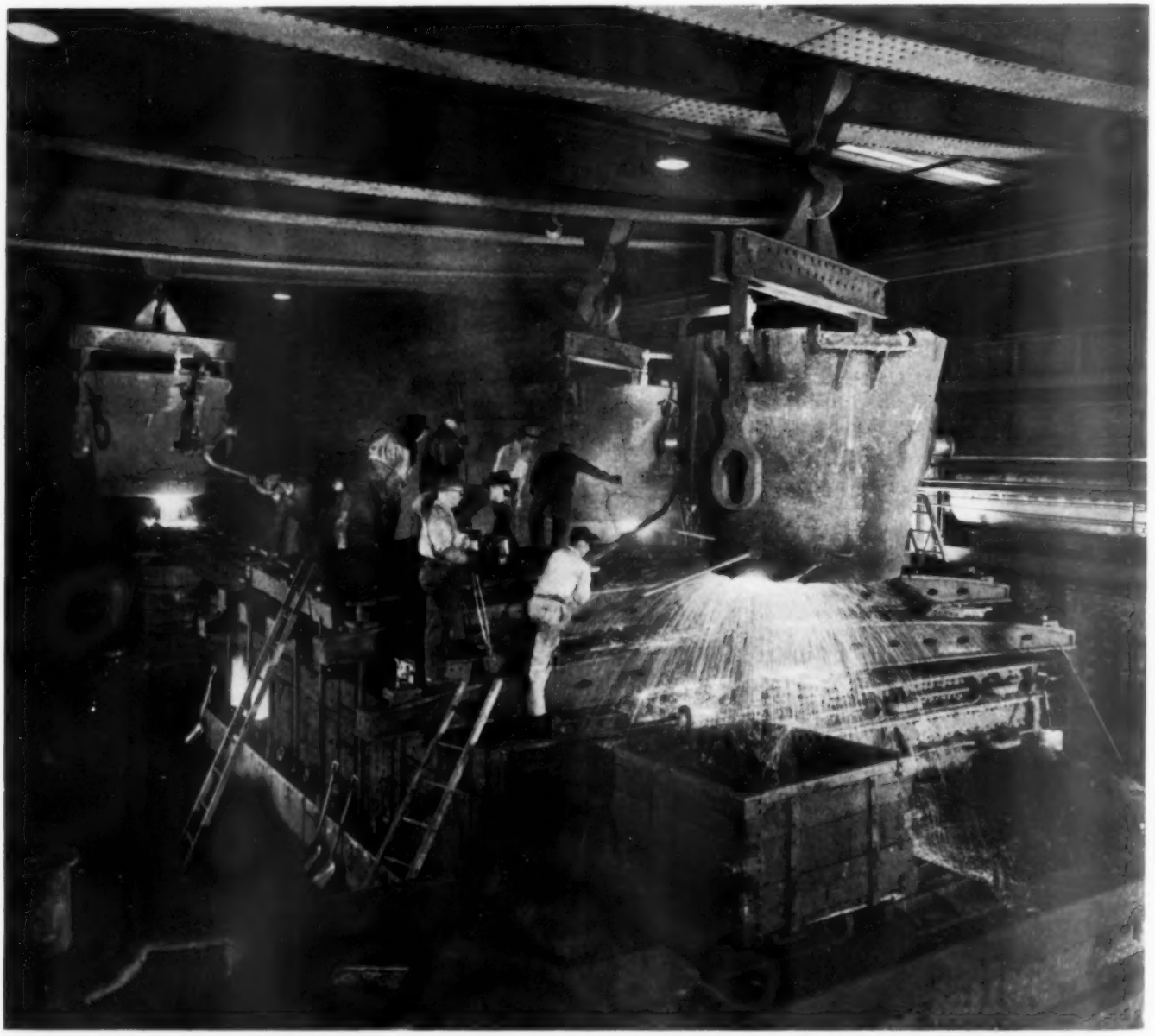
* * *

NEW LEASE on life was taken by Kaiser-Frazer following the injection of a $34.4 million RFC loan. This will provide funds for tooling an entirely new smaller and lower-priced model, as well as for completely restyling present models. It is also considered likely K-F will come up with a new engine, perhaps one of its own design, to replace the 6-cylinder Continental now used, the latter having been the target of some complaints on the score of too low power.

Certified Castings

The American Die Casting Institute, New York, has developed a certification seal with which subscribing producers may identify their zinc die castings as being produced from proper zinc alloys and with adequate processing controls.

Use of the seal is part of a certification plan which is intended to assure customers of uniform quality within specified composition limits.



POURING: This unusually clear view of a pouring scene at the Falk Corp. steel foundry, Milwaukee, shows the casting of a 50-ton part for a hydroelectric turbine. One of the largest steel castings to be poured by the Falk foundry, it required 86 tons of molten metal from three different furnaces

CLECO CHIPPING HAMMERS

. . . . a size and a style for every chipping, calking, beading or sealing requirement.

FAST, POWERFUL ACTION

PRECISION CONTROL

LONG LIFE

LOW MAINTENANCE

LOW AIR CONSUMPTION

CALL YOUR CLECO MAN FOR:

Grinders — Sanders — Rotary Drills — Riveters — Sand Rammers — Chippers — Sealing Tools — Impact Wrenches — Screwdrivers — Hose Fittings — Sump Pumps.

Write for **Bulletin No. 75B**

CLECO AIR TOOLS

CLECO ACCESSORIES

CLECO DIVISION

of the REED ROLLER BIT COMPANY, P. O. Box 2119, Houston 1, Texas, U. S. A.

DIVISION OFFICES

Hollywood 46, California, 8709 Santa Monica Blvd. • San Francisco 5, California, 607 Market St., Room 304 • Atlanta 3, Georgia, 502 Peters Bldg. • Chicago 6, Illinois, 121 N. Jefferson St. • Worcester 2, Massachusetts, 6 St. Elmo Road • Ann Arbor, Michigan, 1580 Mt. Pleasant Ave. • St. Louis 3, Missouri, 2322 Locust St. • Newark 4, New Jersey, 75 Lock St. • Cincinnati 2, Ohio, 431 Temple Bar Bldg. • Philadelphia 33, Pennsylvania, Mascher at Lippincott St. • Pittsburgh 22, Pennsylvania, 109-11 Wood St. • Fort Worth, Texas, P. O. Box 1538

In Canada: Cleco Pneumatic Tool Company of Canada, Ltd., 927 Millwood Road, Toronto (Leaside), Ontario

DISTRIBUTORS IN PRINCIPAL CITIES OF THE UNITED STATES AND THROUGHOUT THE WORLD

ACTIVITIES OF FOUNDRY Groups

Washington

NATIONAL president of the American Foundrymen's Society, Edwin W. Horlebein, Gibson & Kirk Co., Baltimore, was present at the first fall meeting of the Washington Chapter held Sept. 16 in Seattle at the Gowman Hotel. Mr. Horlebein reviewed the activities of the society pointing to the need for further work in education at the secondary school level and for the extension of research. Every chapter has within its group the necessary personnel to develop and bring the organization to the fore, Mr. Horlebein stated. This is a challenge to chapter members to participate voluntarily and unselfishly in work of the society, the reward being more effective realization of the chapter's goal.

Chapter president, E. D. Boyle, master molder, Puget Sound Naval Shipyard, announced the following new directors of the chapter: Jack Reardon, Stan Marshall and Al Zandt.

In addition, Mr. Boyle presented the technical discussion for the evening, his subject being "Insulation of Risers To Promote Fluidity in Nonferrous and Ferrous Metals." He illustrated the talk with slides showing materials and methods used and the results achieved. Mr. Boyle used a sintered diatomaceous earth product which was ground to powder form, mixed with bentonite and small amounts of phenolic resin and water. This material can be shaped into collars, pads and core shapes, or can be formed by hand in its plastic state to form antichillers as well as patterns from which special chills may be cast of metal. The material is dried from 1 to 4 hours at 400° F.

The material after being baked has been used with excellent results to insulate risers on stainless steel, copper, nickel, cast iron, manganese bronze and other bronze castings. Mr. Boyle spoke also of using the sintered material in powdered form as a riser covering to retard heat radiation. It may be used plain on bronzes and cast iron; however, he recommended preheating it for use with risers on heavy aluminum billets.

As an antipiping compound on steel risers, small amounts of fireclay and graphite are added. Used as a powdered covering, the material is effective in preventing freezing over of the riser top. This covering increases the efficiency of exothermic materials by eliminating loss of heat by radiation. In fact, experiments conducted by Mr. Boyle indicate that by insulating risers with collars and a top covering, temperature gradients can be established between casting and riser which give the ultimate in riser efficiency.—*Harold R. Wolfer, Puget Sound Naval Shipyard.*

Twin City

NEARLY 100 members and guests of Twin City Chapter of the AFS inaugurated the 1949-50 season Sept. 13 at the Covered Wagon, Minneapolis. Vaughan C. Reid, vice president, City Pattern Foundry & Machine Co., Detroit, spoke on "Materials Used in the Construction of Production Pattern Equipment." He was introduced by Chapter Chairman Frank Austin, Crown Iron Works, and Joseph Costello, chief patternmaker, American Hoist & Derrick Co. added some personal details.

According to Mr. Reid, patterns are given too little consideration in production control. Improper design of patterns wastes both time and materials in the foundry. He stressed the point that pattern materials cost

(*Continued on page* 154)

PROVIDENCE Chapter of the Non-Ferrous Founders' Society held its first annual clambake Aug. 13 at Chopmist Hill Inn, North Scituate, R. I. In the center foreground of the picture are the officers of the organization. Left to right, they are: John C. Davies, Stillman White Foundry Co., vice chairman; Julius J. Ferrari, Gorham Mfg. Co., chairman; and Ely Portman, Stillman White Foundry Co., secretary-treasurer

Consider these savings

MOGUL® Cereal Binder puts money in your pocket in these three ways:

SAVES TIME...
dries quicker

IMPROVES QUALITY
...yields smooth cores

AVOIDS WASTE...
reduces discards

Ask, without obligation, our Technical Sales Department for full technical service in the profitable use of *MOGUL Cereal Binder.*

CORN PRODUCTS REFINING COMPANY

17 BATTERY PLACE • NEW YORK 4, N. Y.

PHILADELPHIA: Views of the annual outing held by Philadelphia Chapter of the AFS, June 11. W. J. Gallana, E. J. Lavino & Co., headed the entertainment committee in charge of arrangements

(*Continued from page* 152)

much less than the labor involved in making the patterns; therefore it is usually cheaper to use the best materials for production equipment. These pattern materials should be of such nature that their surfaces resist abrasion.

Mr. Reid's firm has been very successful in substituting a 4 per cent copper, 3 per cent silicon, 93 per cent aluminum alloy for the old No. 12 aluminum alloy as a pattern metal. This newer alloy, when solution heat treated shows a Rockwell E hardness between 92 and 97 with a tensile strength of 41,000 psi.

The speaker recommended two bronze alloys for making bronze patterns: an alloy containing 2.25 per cent beryllium and a nickel-silicon bronze with 1.8 per cent nickel and 0.3 per cent silicon. The beryllium alloy, when solution heat treated and aged, produces a hardness of Rockwell C 38-41, which is similar to

(*Continued on page* 156)

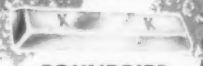
CHICAGO Chapter of the AFS held its annual stag outing and golf at Lincolnshire Country Club, Crete Township, Ill., on Aug. 13 with approximately 1000 members and guests present. Robert M. Jones and Harry E. Cullen, Carnegie-Illinois Steel Corp., were entertainment committee chairman and outing secretary, respectively

KEOKUK electro-silvery

Keokuk metallurgists can help you with your metal and addition problems. Write to us now for this no-obligation service or for complete information on Keokuk Electro-Silvery!

STEEL PLANTS

60 lb. Keokuk Electro-Silvery pigs are used by many leading steel plants for blocking the open hearth heat. They produce excellent results for an equal distribution of silicon and for the best temperature melt-down.



FOUNDRIES

30 lb. Keokuk Electro-Silvery pigs are charged into the cupola by mechanical means or by hand. Easily broken into two or more pieces and measured by weight. 12½ lb. Keokuk Electro-Silvery piglets may be charged by count, eliminating weighing operations. Both sizes are available in regular or alloy analysis.

All three sizes may be handled by magnet!

KEOKUK ELECTRO-METALS COMPANY

KEOKUK, IOWA • *Wenatchee Division, Wenatchee, Washington*

SALES AGENTS: Miller and Company, 332 S. Michigan Ave., Chicago 4, Illinois
Cincinnati 2, Ohio, 3504 Carew Tower • St. Louis 1, Mo., 407 N. Eighth St.

(*Continued from page* 154)

white cast iron. The pattern must be machined after solution treatment and before aging because of the high final developed hardness.

The nickel-silicon bronze, which can be soldered and brazed easily, has the best wear resistance of any bronze alloy yet encountered in pattern work, according to Mr. Reid.—*O. J. Myers, Werner G. Smith Co.*

Chesapeake

FOLLOWING past custom of holding the first fall meeting away from Baltimore, over sixty members of the Chesapeake Chapter gathered in Hagerstown, Md., and visited the plant of the Pangborn Corp. After being guests of Pangborn at a luncheon in the Hotel Alexander, the group spent the afternoon observing assembly of "Flying Boxcars" at the Fairchild Aircraft plant. Stimulating refreshments and a fine dinner were served at the Fontainhead Country Club.

The foundrymen were further rewarded with an appropriate illustrated talk entitled "Technology of Foundry Sand Testing" by Frank Brewster, Harry W. Dietert Co., Detroit. The speaker emphasized the importance of moisture control in foundry sands since it affects green permeability, green compression strength, blows, deformation and slope of stress-strain curve. Mr. Brewster reviewed briefly the equipment and procedure for making moisture, permeability, compression, clay, sieve, hardness, and hot strength tests. Rat tails take place at 1100° F and can be decreased by reducing hot strength or expansion ability of the sand. Questions from the floor were answered and the meeting adjourned.—*Jack W. Schaum, National Bureau of Standards.*

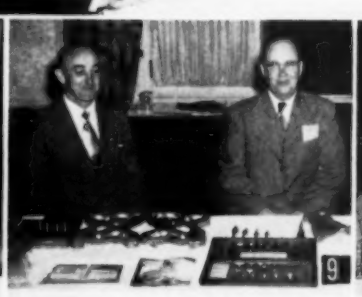
Chicago

CHICAGO Chapter, AFS, squared off on its 1949-50 season program on Oct. 3 at the Chicago Bar Association with a meeting devoted to appraisal of the future course of business, for upon this depends the well-being of the castings industry in the months to come. Principal speaker was Earl L. Shaner, chairman, Penton Publishing Co., and editor-in-chief of STEEL, Cleveland. He discussed business conditions.

The meeting, which was conducted by Chapter President W. D. McMillan,

(*Continued on page* 159)

WISCONSIN Chapter of the AFS opened the season with a group of sectional meetings Sept. 9 at Hotel Schroeder, Milwaukee. In Fig. 1, left to right, are: Charles Zahn, Bernard Fridl and Gil Hels, all of Vilter Mfg. Co., Milwaukee; John Strauch and Harry Schofield, Fire Brick Engineers Inc., Milwaukee, and John Goodwin. Fig. 2, left to right, G. P. Antonic, Walter Gerlinger Inc., Milwaukee, and J. A. Gitzen, Delta Oil Products Co., Milwaukee. Fig. 3, Sid Henricks, Don Ferris and J. Rathlesberger, all of Delta Oil Products Co. Fig. 4, Frank Harris, Belle City Malleable Iron Co., Racine, Wis., who spoke on "Pattern Gating for Malleable Casting," with Harry Arneson, Spring City Pattern Works Inc., Waukesha, Wis. Fig. 5, Earl Woodliff, Foundry Sand Service Engineering Co., who spoke on "Sand and Sand Binders for the Nonferrous Foundry," with Duane Bosma, Bucyrus-Erie Co., Milwaukee. Fig. 6, Carl Petty Jr., A. P. Green Fire Brick Co.; J. Piacintine and Steve Puhl, Federal Malleable Co., Milwaukee; Walter Roach, Badger Fire Brick & Supply Co., Milwaukee, and William Thompson, Milwaukee Chaplet Co. Fig. 7, Walter Edens, Badger Brass & Aluminum Foundry Co., Milwaukee, and Frank Jacobs, Standard Brass Works, Milwaukee. Fig. 8, Jeff A. Westover, of Westover Engineers, and Dan Gerlinger. Fig. 9, Vic Ziemer, of Maynard Electric Steel Castings Co., Milwaukee, with Theodore Redin, Wm. Demler & Bros., who spoke on "Core Blowing in the Steel Foundry." Fig. 10, Robert C. Woodward, Bucyrus-Erie Co., and chapter chairman. Photos by W. V. Napp, Badger Fire Brick & Supply Co.



How to Make Parting Easier...

in the foundry, that is!

Use **"dag"** colloidal graphite dispersions for coating chills, patterns, and permanent molds.

Applied easily by spray or brush, **"dag"** dispersions provide a micro-thin colloidal graphite film that does not affect casting or mold thickness, and greatly improves surface quality. They will also eliminate or reduce the smoke usually caused by parting compounds . . . a definite advantage for the men in the shop.

Try **"dag"** colloidal graphite, too, for lubrication of push pins, shoulder screws and flask pins . . . eliminate binding and stripping.

Find out more about how **"dag"** dispersions can improve your foundry product and your working conditions.

Mail the coupon TODAY!

Coating a permanent mold with "Aquadag" at the Wisconsin Aluminum Foundry Company, Inc., Manitowoc, Wisconsin. "Aquadag" is the ***"dag"*** *colloidal dispersion of graphite in distilled water.*

ACHESON COLLOIDS CORPORATION
PORT HURON, MICHIGAN

dag COLLOIDS

ACHESON COLLOIDS CORPORATION
Port Huron, Michigan

..... Send me more information.

..... Send a sales engineer at my convenience.

NAME .....

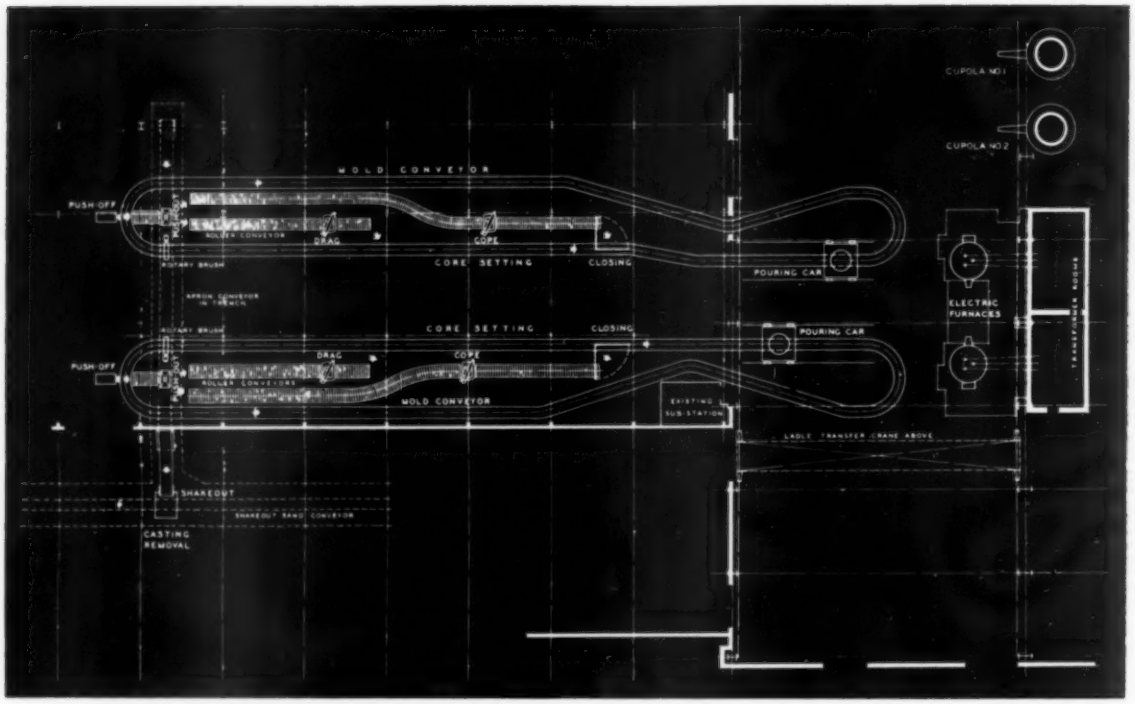
COMPANY NAME .....

STREET .....

CITY ..... ZONE .....

STATE .....

L-14



J. I. CASE COMPANY, BETTENDORF, IOWA

PLANNED FLEXIBILITY

Designed by Giffels & Vallet, Inc. for high speed steel casting production in war work, these molding systems each produced a top of 178 molds per hour.

These molding lines were recently converted, with a minimum amount of change, to economically produce cast iron farm implement castings.

The conversion was engineered through the cooperation of the production engineers of J. I. Case Company and the Foundry Engineers of Giffels & Vallet, Inc.

GIFFELS & VALLET, INC.
INDUSTRIAL ENGINEERING DIVISION
1000 MARQUETTE BUILDING, DETROIT

(*Continued from page* 156)

chief metallurgist, Farm Implement Division Foundries, International Harvester Co., Chicago, was given an international aspect by comments of Chapter Vice President A. W. Gregg, just returned from Europe, and further by the presence of three foundrymen from abroad, two from France and one from Ireland.

Mr. Gregg, consulting engineer, Whiting Corp., Harvey, Ill., was one of two AFS delegates to the International Foundry Congress in Amsterdam, Netherlands, Aug. 29-Sept. 2, and author of the AFS Exchange Paper, "Melting Furnaces in Ferrous Foundries."

The two French foundrymen attending the Chicago chapter meeting were Paul Chatelin, technical administrator, head of the Technical Center of the French Foundry Industry, Paris, and Charles Haller, president and general director, Bidez & Haller, Paris. They were members of a delegation of 17 French gray iron foundrymen just arrived in the United States and Chicago for a six-week productivity study under sponsorship of the Technical Assistance Division, Economic Co-operation Administration. Mr. Chatelin is the group leader. The two visitors were accompanied by William H. G. Fitzgerald, special ECA consultant, Washington. The third foreign visitor was S. W. Aitken, chairman, Hammond Lane Foundry Co. Ltd., Dublin, Ireland.

Mr. Shaner introduced his address by referring to the steel strike, and without hazarding a prediction on its probable duration or settlement, discussed some of the major factors which have a bearing on it and similar labor disputes recently. These factors he designated as insurance and pensions, the attitude of labor, and political.

Pointing out that there is a long-range angle to the matter, he cited that since 1939, increase in population has been about 14½ per cent and increase in employment has been spectacular. Continuing, Mr. Shaner referred to the recent pertinent remarks of John S. Sinclair, president, National Industrial Conference Board, about the relation of expansion in industrial output and plant equipment to the nation's standard of living in the future. In the decade just ending, "we have had the greatest expansion of physical plant in our history . . . . . yet our increase in productivity for this decade was the worst we have ever known." As to why productivity has lagged, Mr. Sinclair suspects "we have failed to gain the active and positive co-operation of the human element in the productivity equation. Productivity results from a combination of materials, tool power and men. Human input grudgingly given can offset the entire expansion of the other physical elements in the process of production."

Mr. Shaner said that once the nation gets through its present labor emergencies, it might be well to devote more intensive study to the question of what is required to rewin

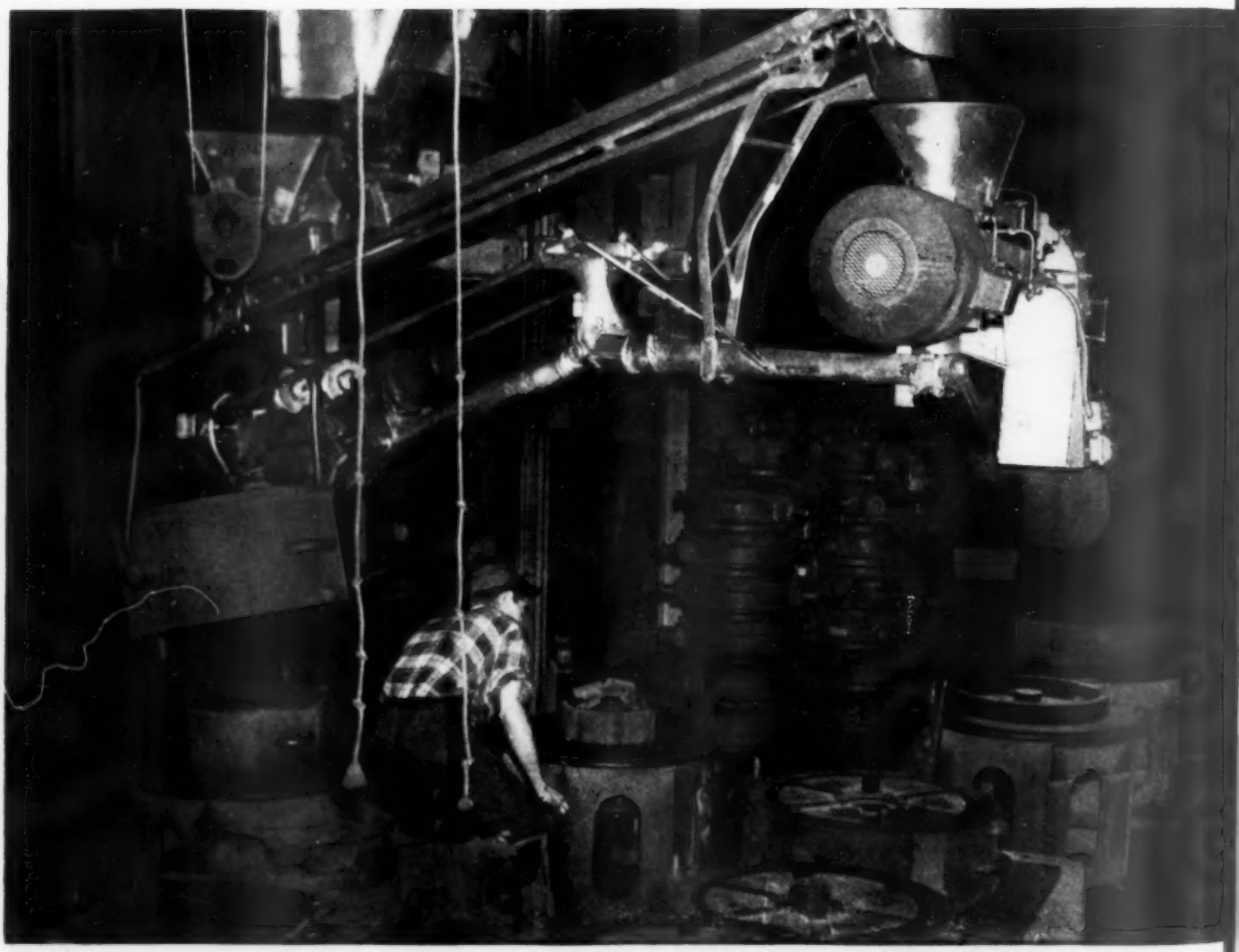
(*Continued on page* 162)

TENNESSEE: Views of the barbecue held this summer by Tennessee Chapter of the AFS are shown above. Shown at upper left, left to right, are: J. B. Frazier, representative, third district, Tennessee; George McInturff, city commissioner; Karl Landgrebe, Wheland Co., chapter chairman; P. R. Oligiati, commissioner of streets and sewers; Roy Hyatt, commissioner of firemen and police, and Paul Arnold, U. S. Pipe & Foundry Co., chapter vice chairman, all of Chattanooga

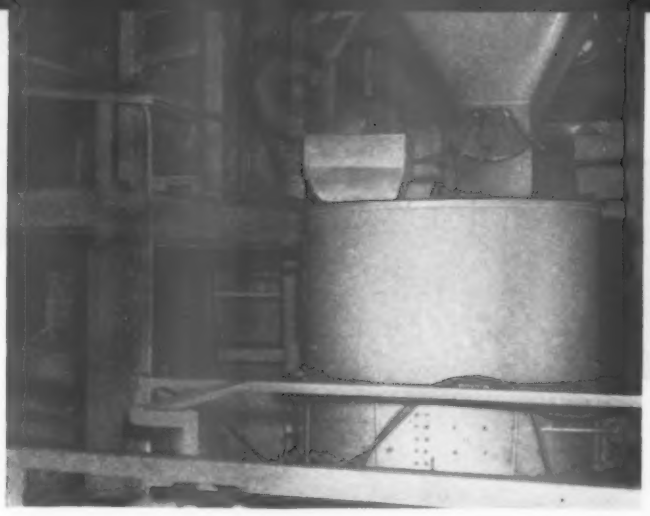
T.B. WOOD'S SONS COMPANY

Double Mold Production wi

STATIONARY SA



This double-belt Stationary Sandslinger is ideal for ramming these small sheave and pulley molds. 21.8 molds per man per day are now produced as compared to 12.3 molds formerly made by hand ramming methods. Not only is productivity increased but molds are truer to pattern and of uniform hardness.



This automatically controlled Model "60" Speedmullor, originally installed to augment capacity of a conventional type mill, proved so fast and efficient that it is now used to mull all of the 200 tons of all-purpose sand required in the foundry each day, while the conventional type mill stands idle.

...with their

SANDSLINGERS

T. B. Wood's Sons Company, Chambersburg, Pa., one of the world's largest exclusive manufacturers of power transmission equipment, recently completed modernization of their forty year old foundry building. After considerable study and planning they solved the many problems encountered, due to the old building's limitations, by installing two Stationary Sandslingers for ramming molds, a Model "60" Speedmullor for mulling all of their sand and mechanized equipment for handling sand and molds.

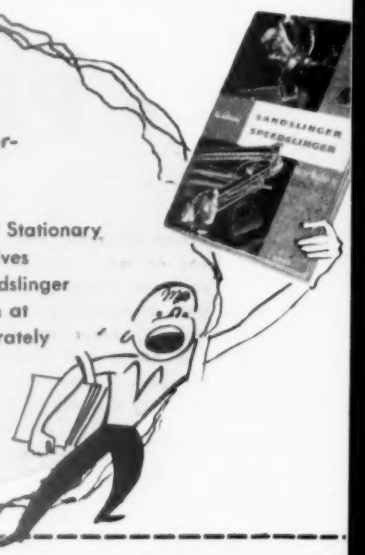
One Stationary Sandslinger, ramming molds for small pulley, sheave and flywheel castings increased productivity by over 75 per cent. Another Stationary Sandslinger, ramming large pulley molds, has doubled production. The automatically controlled Model "60" Speedmullor, originally installed to augment capacity of an existing conventional type mill, proved so fast and efficient that it is now used to mull all of the sand required in the entire foundry . . . over 200 tons a day...while the conventional type mill stands idle.

T. B. Wood's interesting story, fully illustrated, appeared in the July-August issue of Better Methods magazine . . . a copy is available on request.

This Raising and Lowering Arm Sandslinger rams the large pulley and sheave molds. The flasks vary from 4" to 36" in height and from 48" to 78" in diameter. Poured castings range from 200 to 6000 lbs. The production of these molds has been doubled.

Send Now for This New 36-page Stationary Sandslinger-Speedslinger Bulletin!

Fully describes the 9 models of Stationary Sandslingers and Speedslingers, and gives complete details on the exclusive Sandslinger ramming method. Photographs taken at 1/10,000 of a second accurately depict "slinger" ramming action.



JUST SEND THIS COUPON!

BEARDSLEY & PIPER are manufacturers of the Sandslinger • Speedslinger • Hydra-Slinger • Speedmullor • Mulbaro • Screenarator • Nite-Gang • Junior Nite-Gang • Preparator • B&P Champion Speed-Draw • B&P Plate Feeder • B&P Turntable • B&P Gyratory Screen

BEARDSLEY & PIPER

Division of Pettibone Mulliken Corp.
2424 North Cicero Avenue, Chicago 39, Illinois

☐ Send new Stationary Sandslinger-Speedslinger Bulletin
☐ Have an Engineering Representative call on me

FOUNDRY

ATTENTION

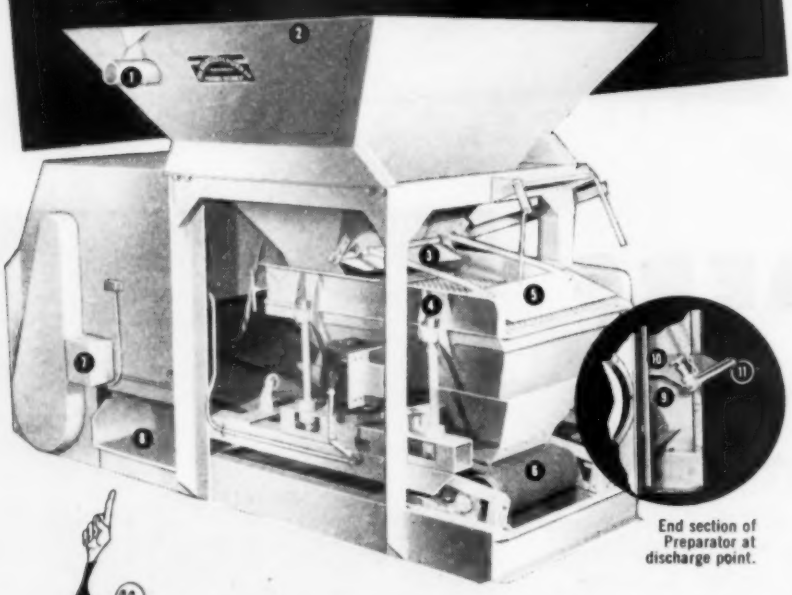
TITLE

ADDRESS

CITY

COMPLETE SAND CONDITIONING WITH MAGNETIC SEPARATION

in one portable unit



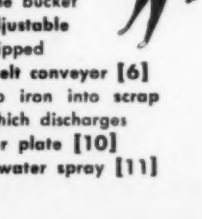
End section of Preparator at discharge point.

Here tramp iron is discharged from machine into scrap box . . . an exclusive Preparator feature.

Newly designed and streamlined, the Preparator provides your foundry with an efficient, dependable, heavy duty, portable sand conditioner. This one machine screens, breaks lumps, magnetically separates, aerates and discharges sand up to 35 feet into pile or bin. Load centered trunnions permit easy movement by crane. Rugged construction assures years of service, even with the roughest of treatment. Completely conditions up to sixty tons of sand per hour!

the PREPARATOR

HOW IT OPERATES



Preparator easily lifted by Trunnions [1]—and moved to any desired location by crane. Shakeout sand is loaded by crane bucket or loader into large open top hopper [2] and feeds through adjustable gate opening [3] onto heavy duty Gyratory Screen [4] equipped with adjustable lump breaker [5]. Screened sand drops onto belt conveyor [6] and passes over magnetic pulley [7] which separates tramp iron into scrap box [8]. The cleaned sand falls onto drum type aerator [9] which discharges it to any distance up to thirty-five feet. The adjustable deflector plate [10] controls the distance the sand is thrown. The water spray [11] at discharge point, provides final tempering.

BEARDSLEY & PIPER
Division of Pettibone Mulliken Corporation
2424 North Cicero Avenue, Chicago 39, Illinois

☐ Send Preparator Bulletin
☐ Have B&P Representative Call

FOUNDRY
ATTENTION
TITLE
ADDRESS
CITY ZONE STATE

Beardsley & Piper are manufacturers of the Sandslinger . Speed-slinger . Hydra-Slinger . Speedmuller . Mulbaro . Screenarator . Nite-Gang . Junior Nite-Gang . Preparator . Champion Speed-Draw . Plate Feeders . Turntables . Gyratory Screens

(*Continued from page* 159)

and hold the enthusiastic "co-operation of the human element in the productivity equation."

Next Chicago Chapter meeting will be Nov. 7 at the Chicago Bar Association and will be a roundtable program with group sessions sponsored by the gray iron-pattern, steel, malleable and nonferrous divisions—*Erle F. Ross.*

Cincinnati

REGULAR monthly meetings of the Cincinnati District Chapter of the AFS were resumed Sept. 12 at the Herman Schneider Foundation with 115 members and guests in attendance. Walter Klayer, Aluminum Industries Inc., Cincinnati, and chairman of the chapter presided. R. B. Kropf, International Nickel Co., was the principal speaker, his topic being "Ductile Cast Iron."

A new engineering material which combines the process advantages of cast iron with the product advantages of cast steel was described by the speaker. Closing the gap between cast iron and cast steel, this material is characterized by a graphite structure wholly in the form of spheroids. As was originally announced at a meeting in Philadelphia in May, 1948, the process for making this new material is based on the introduction of an effective amount of magnesium into iron. Its excellent physical properties, particularly high elastic modulus, high yield strength and high ductility, suggests suitability for many applications heretofore considered beyond the scope of cast iron. Slides were shown indicating the characteristics of the material and some applications. Speculation was made as to the possible applications suggested by the combinations of physical properties available in the various metallurgical structures obtainable in magnesium-treated cast iron.—*John F. Kahles, University of Cincinnati*

Central Indiana

THE first regular dinner meeting of the 1949-1950 season for Central Indiana Chapter, AFS, at the Athenaeum, Indianapolis, Oct. 3, brought out an enthusiastic attendance of more than 125 members and guests who heard a timely talk on "Nodular Cast Iron," by R. G. McElwee, Vanadium Corp. of America, Detroit.

In the course of his address, which was illustrated by lantern slides, Mr. McElwee stressed the necessity for immediately putting recent nodular cast iron discoveries on a realistic

and sound basis. In the maze of facts surrounding this revolutionary discovery, foundrymen must determine just what is desired and needed in this field, he said.

The speaker pointed out that nodular iron is not yet cheaper than the process of annealing iron. He attempted to quell the fear that nodular iron processing is apt to cut deeply into the malleable and steel casting fields. It is more apt to be used for special purpose castings only, in Mr. McElwee's opinion.

Elasticity was listed by the speaker as the most important property of nodular iron, rather than its ductility. The automotive industry, he said, is becoming increasingly interested in nodular iron because of its high resistance to fatigue.

It is true that any foundry can make nodular iron, but only after proper experimentation, he emphasized. No foundry should expect to pour good nodular iron the first time, and he warned against overoptimism in this new field. Other points to be watched, he added, are that foundrymen must throw out many of the old "yardsticks" for casting, and adopt new standards and ideas; and that foundry sales forces will, to sell nodular iron, be forced to place more emphasis on engineering knowledge.

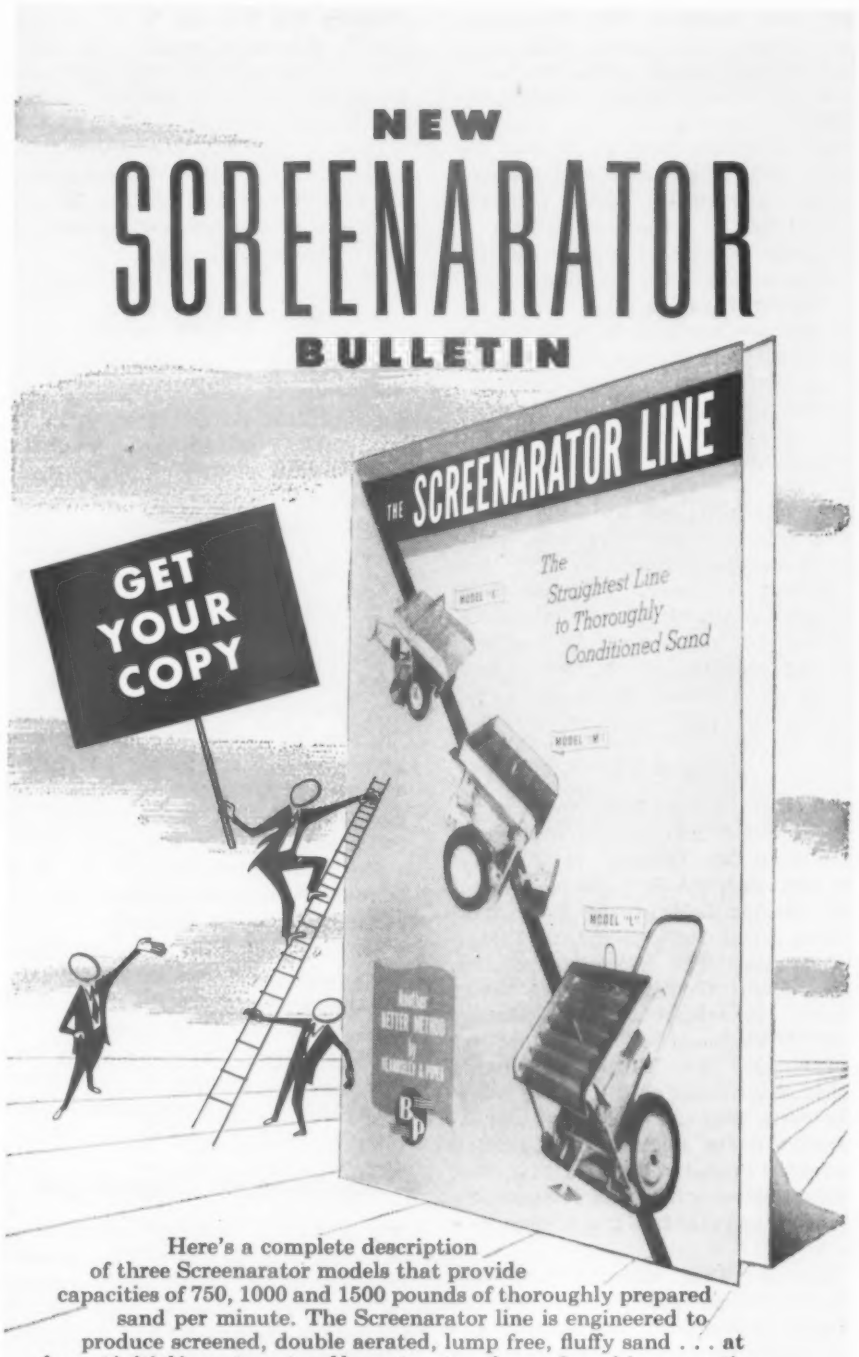
Technical chairman for the meeting was Paul Ulmer, metallurgist, Link-Belt Co., Indianapolis.—*William K. Mitchell.*

No. Illinois and So. Wisconsin

CHAPTER meetings for the current season got under way for the Northern Illinois-Southern Wisconsin Chapter of the AFS at the Bel-Mar Country Club, Belvidere, Ill., on Sept. 12. L. C. Fill, George D. Roper Corp., Rockford, Ill., and chairman of the chapter, presided.

Approximately 90 members and guests heard A. M. Herrmann, supervisor, Racine Steel Castings Co., Racine, Wis., speak on "Inspection Procedures." He summarized briefly some of the practices followed by his company to control the quality in the final product. To achieve this goal, inspection procedures have been set up on all phases of production. Wherever it is possible to do so, statistical quality control techniques are employed. In the remaining phases of production, other inspection procedures are followed, endeavoring at the same time to obtain sufficient data to set up statistical quality control methods for those phases of production in the future.

Inspections include checks on pattern and corebox layouts, green cores,



Here's a complete description of three Screenarator models that provide capacities of 750, 1000 and 1500 pounds of thoroughly prepared sand per minute. The Screenarator line is engineered to produce screened, double aerated, lump free, fluffy sand . . . at lowest initial investment and lowest cost per hour of machine operation.

All types of foundries—ferrous and non-ferrous—production and jobbing, use Screenarators to meet their needs for thoroughly conditioned sand. Castings produced in screenarated sand are of the highest quality and finish.

Regardless of the size or type of foundry, the Screenarator pays for itself in a short time. The coupon below will bring you the new Screenarator bulletin or details on free trial use of the Screenarator.

SEND COUPON TODAY!

BEARDSLEY & PIPER
Division of Pettibone Mulliken Corp.
2424 North Cicero Avenue, Chicago 39, Illinois

☐ Send Screenarator Bulletin
☐ Send details on free trial use of the Screenarator

FOUNDRY
ATTENTION
TITLE
ADDRESS
CITY ZONE STATE

Beardsley & Piper are manufacturers of the Sandslinger • Speedslinger • Hydra-Slinger • Speedmuller • Mulbaro • Screenarator • Nite-Gang • Junior Nite-Gang • Preparator • B&P Champion Speed-Draw • B&P Plate Feeder • B&P Turntable • B&P Gyratory Screen

dry core hardness and dimensions, core driers, core sands, mold hardness, molding sands, gages, templates, checking fixtures, presses, melting operations, castings as well as other inspections not included in this report. All supervisors and foremen attend daily quality control meetings headed by the inspection department at which previous scrap records are reviewed. In addition, daily scrap is displayed where all molders and all persons involved with the making of castings can see it. The scrap is reviewed by a committee for analysis and corrective action.

Mr. Herrmann emphasized that statistical quality control is no cure-all. It is a tool, which if used properly, will give indications of deviations from normal procedures which would lead to trouble if not corrected.

Earlier that day, many members accepted Arthur Rose's invitation and visited the foundry of the National Sewing Machine Co. in Belvidere.—*Jerry M. Zilka, Gunite Foundries Corp.*

Quad City

MORE than 100 foundrymen opened the current season for the Quad-City Chapter of the AFS by attending the Sept. 19 meeting of the chapter held at the Fort Armstrong Hotel, Rock Island, Ill. Principal speaker was Nelson S. Mosher, Alloy Metal Abrasive Co., Ann Arbor, Mich. His subject was "The History and Development of Steel Shot for Cleaning." Mr. Mosher compared various materials used for shot showing both cost and physical advantages. Early research showed disagreement and confusion in shot classification which was remedied by setting up standards for suppliers to meet.

The board of directors met with E. P. Closen, John Deere Planter Works, Moline, Ill., chairman of the Quad-City Chapter, for a short business meeting. The Christmas party was discussed and Dec. 9 was set as the date.—*R. E. Miller, John Deere Planter Works*

Reading

PLASTIC patterns was the topic discussed at the opening meeting of the Reading Foundrymen's Association held Sept. 20 at the Berkshire Hotel, Reading, Pa. Industrial arts instructors of the Reading and Berks county schools were guests at the meeting which was attended by more than 150.

Principal speakers were D. W. Talbott, vice president and general manager, and Franz Schumacher, master patternmaker, of the Cooper Alloy Foundry Co., Hillside, N. J. Following the discussion, some of the methods used in making plastic patterns were demonstrated by Mr. Talbott and Mr. Schumacher.

Paul B. Harner, president of the association, appointed William Davies, Werner Finster and Charles Mundell members of the nominating committee.—*William I. Cassidy.*

Central New York

CENTRAL New York Chapter of the AFS opened the season with a meeting at Hotel Utica, Utica, N. Y., Sept. 9. Seventy-five members and guests were present. E. E. Hook, Dayton Oil Co., Syracuse, and chairman of the New York State Regional Foundry Conference, outlined the program for the affair which is to be held Nov. 25-26 at Syracuse University.

Principal speaker of the evening was W. B. McFerrin, Electro Metallurgical Co., who spoke on "Gray Iron Casting Defects." The speaker first presented a chart listing 30 casting defects and their causes. This chart also showed that many of the defects resulted from the same factor.

He then showed a series of slides of four of the most frequent types of castings defects—shrinkage, blows, scabs and rat tails. He identified each defect as it was shown, explaining the cause and describing the steps that were taken to overcome the fault. A lively discussion period was held at the conclusion of Mr. McFerrin's talk.—*J. A. Feola, Crouse-Hinds Co.*

Northwestern Pennsylvania

REGULAR monthly meetings of the Northwestern Pennsylvania Chapter of the AFS were resumed on Sept. 26. Meeting was held at the Moose Club, Erie, Pa., with more than 100 members and guests present. Chairman Joseph A. Shuffstall, National-Erie Corp., Erie, Pa., presided and paid tribute to Fred J. Carlson, Weil-McLain Co., Erie, and to his committee for their fine job in arranging the annual picnic held Sept. 17.

Lester White, a molder for 21 years at the National Erie Corp., who recently was crowned city amateur golf champion for the second time, was introduced and was given an ovation. As the champion, Mr. White stated that the follow-through with the molder's shovel was the greatest help to his golf game. Other guests introduced at the meeting were J. R. Wark, chairman of the Western New York Chapter; Sterling Farmer, Sand Products Corp., Cleveland; Robert S. Kahn, R. Lavin & Sons Inc., Pittsburgh; also H. B. McKinney, Harold Fried, and William Thompson of the Butler Engine & Foundry Co., Butler, Pa. J. A. Durr, formerly associated with Albion Malleable Iron Co., Albion, Mich., and now connected with Erie Malleable Iron Co., Erie, Pa., was welcomed into the chapter.

Principal speaker of the evening was William M. Ball, metallurgist and foundry consultant of R. Lavin & Sons Inc., Chicago, who spoke on "The Effective Essentials Required in Making Castings." Mr. Ball said that the first three requisites needed in making castings are: First, men; second, machines, and third, materials. Other essentials needed to produce good castings are satisfactory pattern and molding equipment, good metal and an understanding of its behavior and inherent characteristics, sand and its control, and not the least, the handling of men.

Following Mr. Ball's talk, James J. Farina, American Sterilizer Co., Erie, acted as discussion leader.—*Earl M. Strick, Erie Malleable Iron Co.*

Tennessee

ANNUAL barbecue of the Tennessee Chapter of the AFS was held at Signal Mountain Golf and Country Club, Signal Mountain, Tenn., Aug. 27.

Beginning in the morning for those playing golf, members also enjoyed swimming, horseshoes, softball, darts and other games. Supper was served at 5 p.m. featuring barbecued pork and beef. As usual, the barbecue was excellent and thoroughly enjoyed by all.

Drawing for door prizes was made during supper. Credit for the success of the outing was due to the efforts of Fred H. McGee, the Fanner Mfg. Co., J. B. Mullenix, Equipment & Supply Co., and Herbert W. Dent, Manufacturers Equipment & Supply Co., all of Chattanooga.—*Carl A. Fischer Jr., Fischer Supply Co.*

Tri-State

TRI-STATE Chapter of the AFS has announced that its Nov. 4 meeting will be held at Joplin, Mo., and that Clyde A. Sanders, American Colloid Co., Chicago, will be the principal speaker. His talk will be entitled, "How Did Old Timers' Practice Compare with Modern Sand Practice?" The group will meet in Tulsa, Okla., on Dec. 16, and W. B. George of R. Lavin & Sons Inc., Chicago, will discuss "Metallurgy in the Brass Foundry."—*F. E. Fogg, Acme Foundry & Machine Co.*

the WHY... WHERE HOW of foundry handling

Flasks are easily closed by Tramrail and moved to correct pouring conveyor with minimum lost motion.

Molds are poured quickly and safely when heavy ladles ride on Tramrail.

Photographs courtesy of McNally Pittsburg Foundries, Inc., Pittsburg, Kansas.

More than 1,000 foundries are now being served by Cleveland Tramrail overhead materials handling equipment.

WHY? WHERE? HOW?

WHY—Because they are speeding production, cutting costs, improving efficiency. It's not unusual for a foundry to pour 2 to 3 times as many molds after Cleveland Tramrail has been put into service as when ordinary floor conveyances were used. Results are similarly significant for other foundry handling jobs.

WHERE—in every department, foundries are using Cleveland Tramrail to advantage—molding floor, core room, cupola charging, pouring, cleaning, pattern and shipping departments.

HOW—Transporting sand, cores, patterns, flasks, hot metal, castings, scrap from one point to another directly on overhead track without inbetween handling.

Now is the time for you to think in terms of WHY—WHERE—HOW. Why are YOU not taking advantage of the many possibilities Cleveland Tramrail offers? Where can Cleveland Tramrail be put to work in YOUR foundry? How can YOU cut your production costs, improve safety and employee morale through its use?

Cleveland Tramrail engineers will gladly help give you the answers.

GET THIS BOOK!

BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
3825 EAST 286th ST., WICKLIFFE, OHIO

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

(*Continued from page* 81)

the blades are inserted by an expensive machining operation which requires deep notching and weakening of the rotor. Numerous stresses result from wedges set in the notches. Such a wheel is heavier and considered inferior to one with cast-in blades—that is, blades inserted in the mold and wheel cast onto them.

The best wheel undoubtedly will be one with blades cast integral. Strength and heat transfer would be greatly improved and cost probably could be halved. More important, the wheel and blades would be cast at one time, from one temperature, from one ladle, and would possess uniform grain size and structure. Precision investment blades cast from different heats and different temperatures are said to vary in grain size and uniformity.

Present method of producing bladed steam turbine rotor is to mill the blades and machine the wheel from one piece, with exception of the outer shroud which is attached to extensions of the blades with the blades passing through the shroud section and riveted over. This method is very costly. A one-piece wheel would be a decided improvement. Either type of wheel can be cast with two or more alloys poured sequentially to form hub, web or blades, on equipment designed in the project.

Engineering objectives of the project were to develop practical, economical methods in the middle ground between precision investment casting processes and advanced contemporary foundry practice. To this end, the program embraced a most thorough research of foundry practice from ancient through modern times, including enemy arts and wartime innovations.

Design and Process Considerations—Method of production, processes and techniques, and most particularly the controls maintained, are of vital importance in determining functional utility and service expectancy of cast components. It is impossible for a designer to obtain maximum value or even to design as-cast parts for severe service safely without a knowledge of: 1. Influence upon metallurgical and physical properties of the form and of the processes and techniques required for its production. 2. Influence of these processes and techniques on the residual forces within the castings. 3. Variations in grain size, surface continuity and many other process-related variables. Such variables are not detected by nondestructive testing. They may have a far greater effect on the strength and life of the part than major changes in analysis.

No engineer controlling casting process for highly stressed cast forms, or forms subjected to stress at high temperatures, or to corrosive attack, can competently control such processes unless he is well informed of: 1. Machining or welding done on the part. 2. Forces—physical, thermal, chemical—acting upon the part. 3. Service record of preceding parts, where same is available. Some examples are:

1. Cooling and shrinkage strains in the mold are greatly influenced by heads, gates, etc., which heretofore have received little technical consideration, but which may strain or weaken the part in direction of load or may add to or subtract from the thermal stresses encountered in service.

2. Heads or gates, being projections which are removed from castings, create an interruption of surface and a grain size much larger than that in surrounding areas. As fatigue life and many corrosive attacks are substantially proportional to grain size, these as-cast variations are subquality areas.

3. Castings poured quickly, in which the entire mold is filled before appreciable solidification takes place, have far greater stresses and greater internal shrinkage than castings which can be poured in a manner to insure that much of the shrinkage of solidification is fed by incoming metal.

4. In conventional practice metal is run through a mold into heads or risers at temperatures much higher than that needed for the fluidity required merely to fill the mold—this is, so that the head or riser will remain molten long enough to feed the casting. Such castings are inherently of larger grain size due to the higher pouring temperature. The absence of adequate temperature control and the necessity of metal being hot enough can augment this detriment. Flow of molten metal through the mold normally follows the shortest line from the gate to the heads. Local overheating of the mold results in delayed solidification of the hotter areas representing the path of excess metal. These areas are larger in grain size and differ in physical properties from surrounding areas in the same casting. As the casting is stressed in cooling, there is more elongation in the hotter and more plastic areas than in those stronger areas which have cooled first during the process of pouring.

Pouring and Gating — Rate of pouring and ability to pour at a known rate is dependent upon known and maintained dimensions of the gating system and orifice through which the metal flows. Such dimensions are seldom accurately known and almost never accurately maintained in pouring metal through sand.

Temperature Control—Temperature control is of the utmost importance. Previous to this contract there existed no method of continuously indicating and recording the temperature of molten steel in the ladle. Other current practices do not provide desired control. Without such temperature control there is: 1. No approach to a knowledge of fluidity and thence no accurate determination of flow in terms of time and weight. 2. No accurate control of temperature—determined physical and metallurgical variations in castings.

Metal Cleanliness — Cleanliness of metal determined by inclusions of oxide materials, products of combustible bonding materials, oxides, slag and gas, is of vital importance. Nondestructive testing gives only a partial revelation of inclusions, porosities, or incipient porosities. These assume greater importance in material subject to thermal shock (as the variable expansions of foreign bodies create focal points of stress and failure) than in cold mechanical applications.

Interruptions to surface by minute foreign bodies are focal points of corrosive attack and have varied notch-effects under stress. All the materials conventionally used for furnace linings, ladle linings and molds disintegrate under the temperature and erosion of molten metal, practically in geometrical relation to time, temperature and pressure, each compounding the other. No approach to maximum physical properties, fatigue resistance, corrosion resistance or related service expectancies can be made without eliminating the residue of such disintegrated refractories and the gaseous products threof, or controlling them to a level heretofore unattained in commercial casting.

Because most of the known and easily recognizable factors contributing to inclusions, casting defects and casting strains, are inherent in conventional foundry practices, they have long been accepted and compensated for with increased section, heat treat-

(*Continued on page* 168)

For Melting Non-ferrous Metals In Any Furnace--

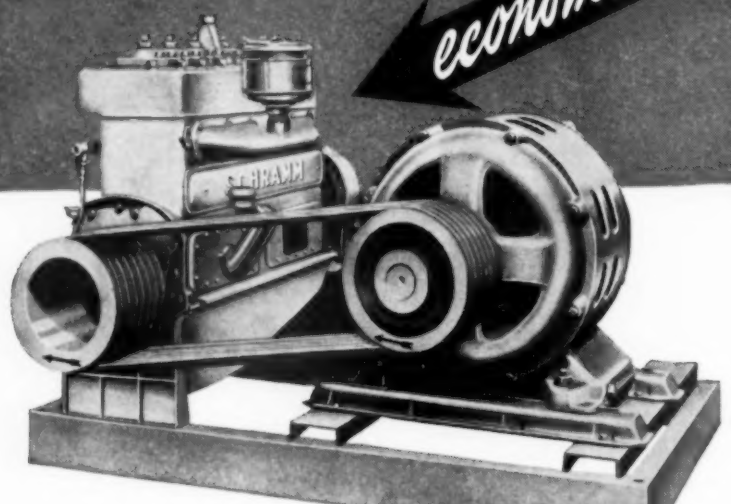
--NORTON Refractory Cements

For melting all non-ferrous metals — in high frequency and induction furnaces, pit furnaces, direct arc type rocking furnaces — Norton Company offers a complete line of high temperature cements and prefired shapes. **Fused magnesia cements** for lining Ajax-Northrup high frequency furnaces melting nickel-chromium alloys; **silicon carbide mixtures** for ramming into oil or gas fired reverberatory and pit furnaces melting aluminum, copper and zinc; **fused alumina cements** for lining burner tunnels in gas or oil fired billet heating, heat treating and annealing furnaces; **fused magnesia cement** for rammed linings in Ajax-Wyatt low frequency vertical ring induction furnaces melting high copper alloys, and cupro-nickel, nickel-silver and cadmium-bronze alloys.

NORTON REFRACTORIES®

NORTON COMPANY
WORCESTER 6, MASSACHUSETTS

MORE AIR economically!



- **FOR PRODUCTION and MAINTENANCE**
- **FOR SPEEDY PNEUMATIC TOOLS**

SCHRAMM INC. offers a complete line of Industrial Compressors in sizes ranging from . . . 2 to 600 cubic feet displacement . . . Built and designed for continuous heavy duty service with a minimum of attention.

Available in "V" or Flat Belt Drive . . . on base for belt drive from motor or engine . . . or, with direct motor drive. No special foundation required . . . can be bolted to any substantial floor.

Where running water is not available the SCHRAMM Cooling Unit will prove adequate under severest conditions. Accessories essential to any modern industrial installation can also be provided.

Write for Bulletin #4910.

Important Features

Compact...Easy To Install
Mechanical Intake Valve
Force Feed Lubrication
100% Water Cooled
Electric Push Button Starting
En Bloc Construction
Easy Accessibility
Vibrationless
More Bearing Surface

SCHRAMM INC.

THE COMPRESSOR PEOPLE
•
WEST CHESTER PENNSYLVANIA

(*Continued from page* 166)

ment of materials responsive to such treatment, and in the hopeful substitution of forgings or fabrications for castings. The forging of materials not subject to structural change by heat treatment creates greater stress than casting. The higher strength alloys are difficult to roll, and retain rolling strains. Most rolled heat-resisting alloys are compromised in high temperature strength and stiffness to facilitate rolling. Welds in many types of materials create great strains which cannot be fully relieved by heat treatment.

Castings cannot be generally dealt with by analysis classifications as can mill products, but must be considered as individual forms, and the analysis, metallurgical and physical factors evaluated in proper relation to form, process and service. It appears that many materials and/or many forms can best be produced by casting, and it becomes incumbent to recognize the special merits by which castings excel, and to develop these to a maximum, as well as to recognize and strive to reduce their possible irregularities.

Tri-laminar As-cast Structures—In any approach to logical utilization of castings in design and structure, it is necessary to recognize the nature of the as-cast structure. This is inherently tri-laminar in that the metal is cooled rapidly on the surface adjacent to the mold, consequently it has a fine-grain structure on the surface encasing a progressively coarser internal structure. The relationship of case to core varies with the section, the form and the surface-to-mass ratio. An ideal tri-laminar cast form would be similar to a cross section carburized piece with a continuous case or outer skin enveloping a core. This fine outer skin is in most forms in compression; this with its higher ductility resists notch effect and shock and is a dampener. It has greater resistance to surface corrosion on grain boundaries.

This tri-laminar structure cast under advanced techniques can be far superior for many purposes, particularly in a combination of stiffness and shock resistance with a uniform structure. Whereas a carburized bar is in effect a hard tube enclosing a tough core, a cast bar is in effect a tough tube enclosing a stiffer core. A tri-laminar casting in proper stress balance has the merit peculiar to a laminated structure such as plywood. Just as peeling off an outer ply from plywood would unbalance stress and create warpage, so does machining of one side of a tri-laminar casting structure contribute to warp-

age. The removal of the fine surface grain envelop reveals a coarser grain having less ductility, less fatigue resistance, and more susceptibility to carbon penetration and most corrosive attacks.

Thus, if the maximum service values are to be obtained from castings in as-cast condition, they should preferably be unmachined. This imposes the necessity of far closer casting tolerances and far better surface finishes than have heretofore been obtainable.

Mold Surface Temperatures—The heating of molds retards the cooling of the casting and thus creates a larger grain structure in proportion to the temperature differential between the metal and the mold and the conductivity of the latter. While mold heating is generally undesirable, except where a coarse structure is desired, it may be highly desirable to locally heat molds in selected areas to: 1. Retard heat transfer to facilitate running some thin sections of a given casting. 2. Keep a gate or head hot to improve feeding. 3. Delay cooling of a given section so that it may shrink dimensionally rather than internally in feeding an adjacent section. 4. To offset surface-to-mass differentials and effect uniform timing of solidification. 5. To balance in a given mold the excess temperature in some other portion of the mold resulting from an unavoidable head or gate area.

As-cast sections in most metals and alloys have increasing ductility and elongation in bend test as the section is reduced. A ⅛-inch section may have more than twice the elongation of a ½-inch section cast from the same ladle. Where a 1-inch section of an as-cast nickel-chromium alloy had 12 per cent elongation, ⅛-inch section of the same casting had 38 per cent elongation. This difference in ductility arises from grain size differentials inherent in the surface-to-mass ratios and the different cooling rates of the different sections. Therefore it is obvious that:

1. The standard data more or less applicable to heat-treated materials, rolled products, etc., have little or no relation to as-cast sections. 2. The basic structure in many cases is far more important than variations in analysis, or even in some cases than the material selected. A brittle material can be ductile in thin sections while a ductile material can be brittle in thick sections. This is particularly true of thick sections poured at high temperature having a large grain size.

In many heat and corrosion resistant alloys in as-cast form, there

Handy Guide for Determining the Size Combs Gyratory Riddle You Need

A Combs Gyratory Foundry Riddle will process a volume of sand equal or greater in amount than that riddled by hand of 10—20—30 men, depending on the unit employed. For instance:

Type V—10 manpower capacity
$225 complete

Type V-5 — 30 manpower capacity. Same style as Type V, shown above, but with 36" dia. Sieve. Complete—$400.

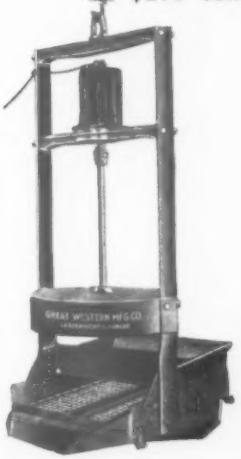
★

Available for Prompt Delivery from Your Foundry Supply House

★

Type CR — 20 manpower capacity
$280 complete

Type CS — 20 manpower capacity
(with automatic discharge)
$290 complete



Combs • Gyratory • Foundry • Riddles

GREAT WESTERN MANUFACTURING CO.
LEAVENWORTH, KANSAS, U.S.A.

is a difference of 3 to 1 in degrees of bend-test in two specimens of the same section poured at 100° F difference in temperature, the lowest temperature producing far superior test results. The lowest temperature which will produce a sound casting is desired. In conventional process no two molds are poured at the same temperature. Physical properties of a given part vary greatly with varying sections and contribute extensively to the distribution of stress within the piece.

Test data arrived at from usual physical testing with conventional cast test bars, either standard or precision, bear a very indefinite relation to any other form or section poured at any other temperature than the test bar. In thin as-cast sections many hard materials become relatively soft, and changes in analysis to obtain maximum physical properties may open a new metallurgical approach to casting improvement.

Mold Surfaces and Permeability—There are no scientific standards or established method of measuring, evaluating or controlling mold surfaces. These commonly consist of sand or similar granular materials which resist heat, bonded and separated by materials which do not. Means of evaluating mold surfaces and metal surfaces cast against them must precede needed controls.

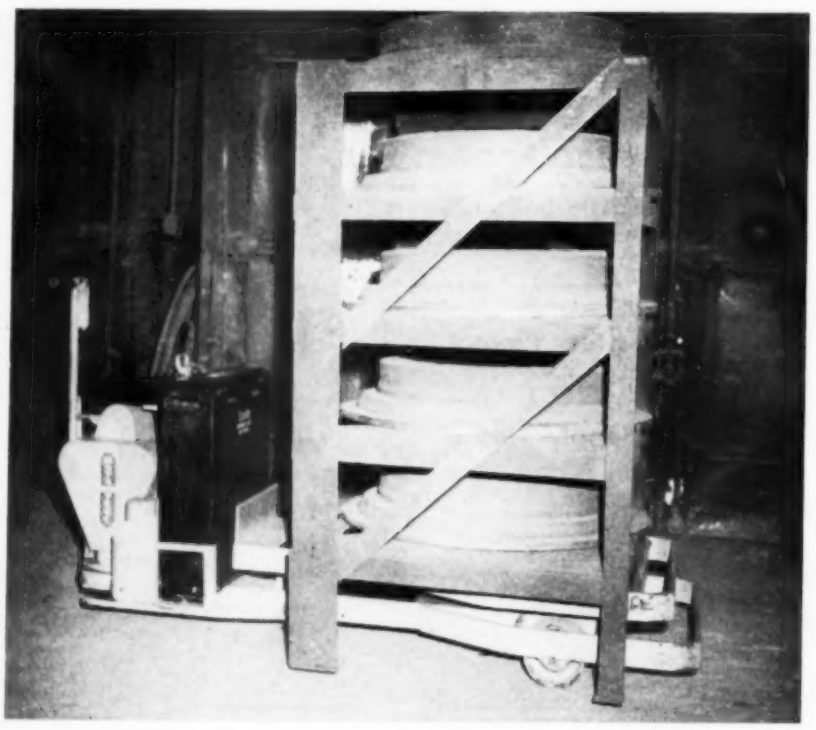
Release of air from molds, and with it what minute quantity of gas may be contained in metal, can be accomplished by vents. Need for a porous mold, or permeability, is largely to permit escape of steam and the products of distillation and combustion of organic bond materials. Thus released, it condenses in the colder sand further from the surface or escapes to air.

Need for permeability is almost proportional to the percentage of water and organic materials in the mold. It can be largely or completely eliminated with the elimination of water and organics. Organic bond materials are generally hydroscopic and vary with atmospheric and other conditions in their loss to, or pick up of water from, the air. Cores presumptively dry generally absorb water from green sand molds. Cores and molds free from organics would be highly desirable.

To this end, improved mold materials, particle controls, surfacing materials, bonding and methods of dehydrating require research and development.

Economics—It is essential wherever possible that any new materials, methods, processes, controls and equipment be so developed as to lend themselves to economical as well as technical ends. It is anticipated that casting research and development will result in lighter, stronger and more serviceable castings at a lower cost in ratio to their service performance; also, that such castings can be readily produced in quantities, should need arise.

Some economic considerations are: 1. Increasing yield, or the percentage of usable castings per pound of metal poured, holds great economic advantage. A 40 per cent reduction in the gating and heading of nonusable metal poured, would produce the same usable castings now produced on five heats, from four heats with many great incidental economies. 2. Substantial economies in floor space, materials handled, cleaning, machining, and scrap, should logically result from envisioned improvements in foundry practice. 3. Broader application of improved castings for defense may broaden markets for industry to general economic benefit.



CORE HANDLING: Large cores are handled with ease in a cast iron pipe foundry by this walkie-type electric truck. The truck, said to be the most powerful of its type, has a capacity of 10,000 lb. Its platform tapers at the front for convenience in placing it underneath the core rack and withdrawing it. (Photo courtesy the Moto-Truc Co., Cleveland)

Install Necessary Equipment

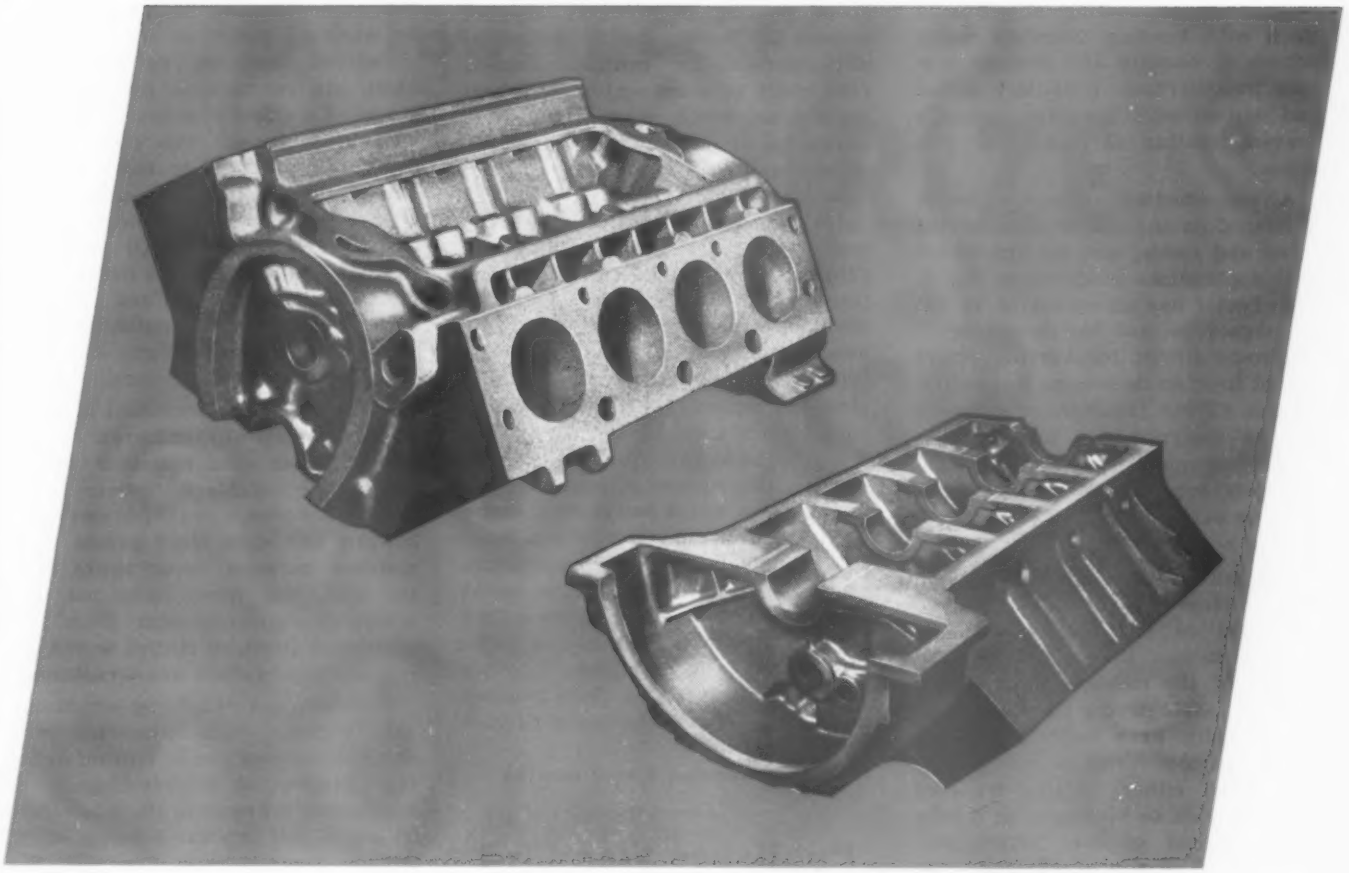
First step in initiating work under the Navy contract was to install in the Alloy Engineering & Casting plant the necessary laboratories and equipment needed to facilitate the study of such subjects as method of producing castings, mold and core materials, pouring and gating, metal and mold temperatures, mold atmospheres, pouring rates, metal cleanliness and structure. Present equipment includes a ceramic laboratory, a ceramic workshop and kiln room, a tool and die shop and a casting production line. Three electric arc furnaces of 400, 1000 and 3000 pounds, respectively, were available in the plant. For induction heating of molds or selected mold areas, for induction heating of ladles, and melting under vacuum or controlled atmosphere, 200 kw of 3000-cycle power is utilized during each working period.

A study in flow of mold materials under pressures applied from one or more directions and by different speed-pressure variations with and without vibration was implemented first with a specially-built pneumatic jolt-squeeze push-off machine coupled to a 600-pound air compressor; and second, with 60-ton floating-head hydraulic press with a 36 x 36-inch square table tied in with jolt-rollover machine, a 100-ton double-acting toggle press.

The ceramic laboratory is especially equipped for pulverizing, grading and

(*Concluded on page* 172)

Another Engineering Achievement by BUFFALO PATTERN WORKS



These New Motor Blocks Are Made With High Accuracy Buffalo Pattern Works Equipment

Buffalo Pattern Works recently completed several duplicate sets of machined, high-speed production equipment to produce this late model cylinder block with a low scrap ratio and low machining cost. This brand of skill has been the hallmark of Buffalo Pattern Works for over 56 years.

We invite you to consult us regarding your production pattern requirements.

Since 1893

BUFFALO PATTERN WORKS

830 HERTEL AVE. BUFFALO, N. Y. RI. 3512

(*Continued from page* 170)
coating small particles of sand, oxides, ceramics and a variety of materials including synthetic sapphire which has been used in particle size to 0.4 micron. Vacuum heat and vibration are combined in a special machine to dry and wet micro particles individually prior to coating and mixing them with bonding materials which adhere in clusters and produce surface irregularities. (Capillary action and atmospheric moisture normally prevent coating of individual particles.)

A conveyorized dielectric heater developed on the contract for drying cores and molds, and for specialized heat applications is shown in Fig. 3. This heater has an output of 35 kw, 40 megacycles, and has an automatic electronic circuit for varying power output to offset decreasing loss factor. It has 85 kw transformer capacity and is designed for ultimate 105 megacycle operation. It has a capacity of approximately 1500 pounds of cores per hour, and can bake, cure or fire a variety of mold materials.

Because of the small volume of sand employed in a new type of mold developed on the project and the great reduction in size, weight and section of the molds, advantages of dielectric mold drying can be applied economically. Such molds require no flasks, in most forms no core plates, and cores either require no core dryers or can be processed on a very small number of core dryers produced from plastic or the core material itself. The drying cycle for small cores, ranging from pin cores up to molds approximately 2 feet square and 4 inches deep, runs from 20 seconds to 4 minutes. A perforated stainless steel conveyor with variable-speed, continuous or intermittent drive, acts as the bottom applicator or ground.

The ceramic workshop is equipped with the necessary tools for mixing ceramics, shaping them into mold, core and gating compoments, and drying and burning them. Located in an adjacent room is a large ceramic kiln. In this room also are crushing and granulating equipment since ceramics used in the project are practically 100 per cent reusable.

Casting Facilities—A general view of the advanced casting facilities is shown in Fig. 1. From left to right, and keyed numerically are the following: (1) Gas bottles for mold atmosphere; (2) electric convection desiccator for dehydrating ceramics; (3) special Globar heater to preheat Rayotube pyrometer target tubes to 2600° F; (4) Rayotube pyrometer assembly; (5) rack of reserve pyrometer lances; (6) 28-inch diameter centrifugal casting machine with rotating guard; (7) vacuum pump and tank; (8) 40-inch diameter centrifugal casting machine with rotating guard; (9) support column for head heating induction coil; (10) trajectory spout pouring basin; (11) support column for pouring basin—hydraulically operated for precision travel; (12) chart of cross section of wheel casting on which moving indicator shows travel of pouring spout; (13) metronome for determining lifting rate of trajectory spout.

(14) electronic control panel for new centrifugal casting machine; (15) rocking cradle for secondary pouring basin; (16) 20-hp variable-speed electronic-controlled motor for new spinners; (17) 200-kva, 800-volt, 3000-cycle induction heating unit; (18) new centrifugal casting machine with 72-inch diameter turntable; (19) 6 x 6 x 30-foot pit housing spinner drives; (20) pouring controller or metal meter which hangs from crane hook and in use this supports a ladle. It continuously records temperature of metal in the ladle, weighs metal poured and records pouring rate; (21) holding ladles induction heated to be equipped with bottom pour; (22) 20-feet to right is engine room housing diesel engine and induction generator for melting unit.

(*To be concluded next month*)

Publishes Standard Welding Terms

To formulate a suitable, standard terminology for welding, the American Welding Society, 33 West 39th St., New York 18, has published the *Standard Welding Terms and Their Definitions*. Preparation of the book, which contains more than 500 terms and 57 illustrations, represents four years of intensive effort. Issued concurrently with the terminology is the "Standard Master Chart of Welding Processes and Process Charts," compiled during preparation of the standard terms. Copies of the book may be obtained at $1 each, and copies of the chart are available at 35 cents per set of five. If purchased together the cost is $1.25.

Link-Belt Co., Chicago, has opened a new district sales office at 422 Board of Trade Bldg., Duluth 2, Minn. The new office, under direction of John E. Morrison, assisted by Harold A. Ivarson, will serve northeastern Minnesota, northern Wisconsin and the upper peninsula of Michigan.

THE BRITISH TEAM REPORTS ON U. S. STEEL FOUNDRIES

(*Continued from page* 92)
development, which has been delayed by war-time priorities.

Canteen facilities, on the other hand, are conspicuous by their absence. Very few foundries even provide mess-rooms. The usual practice is for meals to be taken by the side of the job (the time allowed for the mid-day meal is seldom more than half an hour). All foundries have automatic machines for the sale of soft drinks, peanuts and the like, and in some case provision is made for meals to be brought in from saleshops or travelling vans.

Sports clubs, as organized in Britain, are practically unknown among the American steel foundries visited—with one notable exception. There exist, however, organizations for bowling and some other games, with matches between departments, and the like, but these have not the monetary encouragement from the companies to which British works social and sports clubs are accustomed.

Housekeeping—Lighting conditions vary widely. Some otherwise good shops make poor use of natural lighting. Neglect of window-cleaning is responsible for some of the dimly daylit shops, and this carelessness about window-cleaning is in line with the general air of neglect of buildings which is all too prevalent—with a few exceptions. Adequate light was to be found at all workplaces, less in the form of a general high intensity than by local lighting. The almost universal neglect of whitewashing or repainting of walls tends to give an impression of dinginess when compared with the well-lit shops and annually lime-washed walls in Britain. The difference between the average U. S. steel foundry and the few which took real care for appearances is most striking.

Thanks in part to the more modern layout of buildings, the standard of tidiness in American foundries is high. Concrete floors are the rule rather than the exception, and there is an air of orderliness about the flow of work. The best does not surpass the best British practice, but the general average is better. This is not quite comparing like with like. It is always easier to keep tidy a shop which is mechanized on a regular flow of production. This suggests that organization of British

(*Continued on page* 174)

For
Greatest Efficiency
At Lowest Cost

DESULFURIZE
with
SODA ASH

For a Special Soda Ash
At No Extra Cost

Specify SOLVAY
TRADE-MARK REG. U. S. PAT. OFF.
2-10 SODA ASH

Especially Designed for Desulfurization
★ MEDIUM GRAIN SIZE
★ DUSTLESS
★ HIGH CHEMICAL PURITY

SOLVAY SALES DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.

(*Continued from page* 172)

steel foundries on line production principles, even with jobbing work, would pay dividends in tidiness and ease of control.

Equipment — The first comment must be upon the amount of equipment available. Following the principle of economizing human effort, power assistance is to be found everywhere. Similarly, rather than have a man spend time looking for equipment of which there is enough in the shop, provision is made to have far more than enough. This is not as wasteful as it might sound, since equipment does not wear out by the calendar, but by being used.

The most striking point observed in the use of gantry cranes is the speed at which they work. In hoist, traverse and travel they move much faster than is normal in Britain. Magnets are used to a far greater extent, for conveying small castings. It was instructive to observe a furnace bogie being unloaded by a magnet crane, *with no one in attendance at floor level.*

Molding machines of most types are used to a greater extent than in Britain. The bulk of castings made in the U. S. are produced by machine molding, and jobbing is represented by an exceedingly small proportion of the whole. In view of the importance of speed, it was surprising not to find simultaneous jolt squeeze machines in operation.

There was remarkably little evidence of dimensional inspection. During the whole tour only a dozen or so castings were seen on surface tables, though occasional examples of checking by means of jigs and gages were observed.

Plant Layout—The layout of molding shops was usually found to require the least possible travel of steel from the furnace to the casting floor, although there were some exceptions which appeared to have been designed to afford the greatest possible difficulty in getting steel to the molds.

Overhead delivery of sand is the general rule, except in the case of facing sand for work in large boxes which are left *in situ* after closing. Backing sand was seen being delivered right into a large box in one-ton dollops, from a grab on the crane. A depth of nearly 18 in. of loose backing sand can be rammed up with a wind rammer, and apparently gives satisfactory results. This demonstrates the advantages enjoyed by the Americans in using sands of high flowability. The American practice of providing overhead sand to jobbing molders by means of swinging conveyor bands is a development which saves a great deal of effort in fetching and carrying.

In two or three foundries centrifugal casting was observed but nothing seen was in advance of British practice. In one foundry, casting alloy steel rings centrifugally in steel chills, it is the practice to follow the steel with a heavy covering of slag, and it was stated that this reduced the tendency to center-line weakness.

In all the molding methods observed, the influence of the Steel Founders' Society of America is apparent. They have mastered the problem of getting the results of research onto the foundry floor. The effect of their work is seen in the virtual uniformity of methods adopted, and in the confidence displayed by supervisors in the correctness of their methods.

Cleaning Room—No care is taken about clearing out shot from recesses of castings after the blasting operation. This doubtless saves a certain amount of time, but it has the effect, especially where round malleablized shot is in use, of making the floor where shot has spilled dangerously slippery.

No false modesty is exhibited about welding. It is recognized as a method of repair giving perfectly satisfactory results. Welding booths are in the production line, and inspectors mark castings for welding up of faults which would almost certainly require rejection in Britain. Welders require a certificate of competence before undertaking work of a vital nature.

Cost Accounting—There are many steel founding companies in Great Britain to which the best American foundries have little to offer in the way of improved costing methods. On the other hand, there are several which cannot fail to benefit as a result of the adoption of proper costing methods, or which are not deriving the full benefit from such systems as are operated.

Of those American firms visited, less than a half can be said to have satisfactory systems in the sense that (a) an accurate cost per unit product is determined, and that (b) provision is made to management of the means properly to control expenditure. Unless a cost system achieves both (a) and (b) it is not performing its proper functions.

It is surprising to find that in an industry which consistently puts into practice the technical information widely disseminated by the Steel Founders' Society of America, so small a proportion attempts to practice the remmendations of the Society as published in "Manual of Job Cost Finding Practice for Miscellaneous Jobbing Foundries" published in 1940.

Productivity—Productivity in terms of man-hours per ton is undoubtedly higher in the U.S.A. than it is in Britain, by something between 50 and 90 per cent. To sum up: High productivity is consciously sought under the compulsion of the keenly competitive spirit which is inseparable

(*Continued on page* 176)

SERVICE AWARDS: Hamilton Foundry & Machine Co., Hamilton, O., held its fifth annual service pin award banquet Sept. 12. Pins were awarded to employees having 5, 10, 15 and 20 years of service with the company. Peter E. Rentschler, company president, is shown above presenting 10-year pin to Solomon Croom with Roy Taylor, another 10-year service man, looking on

chosen for an *exacting* job! by FRONTIER BRONZE CORP.

STARRBIDE — the NEW Carbon Bonded Silicon Carbide Crucible — is the choice of Frontier Bronze Corporation of Niagara Falls, N. Y., for manufacture of their outstanding high strength aluminum alloy 40-E. This alloy, designed to meet extremely critical specifications, demands the best in production technique and equipment. STARRBIDE, with its new, revolutionary, thin wall design, received immediate acceptance as an important factor in producing alloy 40-E.

STARRBIDE *belongs in your foundry!* Write for full details.

STARRBIDE CRUCIBLES

★ STARRBIDE CRUCIBLES produce more metal per furnace per day because furnace linings need not be changed to accommodate a larger melt than the conventional crucible would handle . . .

★ STARRBIDE CRUCIBLES provide more metal per heat because the new, scientific wall design increases the amount of metal a given size crucible will hold . . .

★ STARRBIDE CRUCIBLES provide more heats per furnace per day because the wall design affords a faster heat exchange . . .

★ STARRBIDE CRUCIBLES decrease the cost of fuel per pound of melt since the source of heat is closer to the metal . . .

★ STARRBIDE CRUCIBLES are lighter, easier to handle. They will suffer less from damage in transporting to and from storage.

AMERICAN CRUCIBLE COMPANY
NORTH HAVEN • CONNECTICUT • U. S. A.

(*Continued from page* 174)

from modern America, and encouragement is given to all employees in the American steel foundries to produce at a high rate.

Castings are required to be functionally adequate. Perfection is no *desideratum,* where it has no functional significance, and defects segregated to unimportant parts do not seem objectionable to the users. Tolerances and limits are no closer than necessary to meet the duty required. "Good enough" is precisely that.

Despite these positive statements, investigators of conditions in the U. S. must confess to meeting continual contradictions which are traceable to the co-existence in American life, of two warring motives.

The one is a fiercely self-conscious individualism, finding its expression in the competitive spirit—the right of every man to fight his own way towards his self-appointed goal.

But this competitiveness has produced the compulsion to standardize products, leading in turn to standardization of consumer goods, of habits of living and modes of thought, in violent opposition to the principles of individualism. The more the second motive, that of achieving a high standard of comfort, and of freedom from heavy labor, is given expression, the more is individual choice confined to standardized means of satisfaction.

It would be strange if there were not violent contradictions to be found among people who at one and the same time hitch their wagons to the stars of individualism and uniformity.

The British Team incorporated in its report certain recommendations based on its American observations which could lead to higher production in Great Britain. Those remarks concerned with plant layout, equipment and production practices follow:

Many of the steel foundries in Britain have grown haphazard into a jumble of buildings in which it is difficult to follow the sequence of operations, let alone design an even flow of work. It is a long-term matter to reconstruct them, but the choice is surely clear—either they are put into more efficient form, or they come under the hammer prepared for the inefficient. That it will be a slow business getting the new layout into shape is all the more reason for starting now. The problem becomes no easier by waiting.

Long-term policies, however, will not give quick enough effects. Even within existing shops methods production of steel castings can be made easier by rearranging the work. There is a common practice in jobbing foundries of allowing a molder to do this work all over a certain area. He moves from job to job, and every move means that his requirements must be brought to a different place.

American practice and the best practice in Britain puts even jobbing work on the production line to the extent that the molder and his supplies have a fixed location, where work moves to him for completion, and away from him to the next stage. (This, of course, applies to small and medium-size work only.) Similarly in other departments of the foundry, rearrangement of machinery and work benches can reduce the amount of handling to be done, and simple means can be devised to reduce the unnecessary handling which is incurred because castings are piled on the floor and must later be put into skips for removal farther along the line of production.

Install More Machinery

Installation of machinery can be effected in many foundries to give quick improvement in productivity. All American foundries were seen to have good methods of handling materials. Quick acting cranes, fork lifting trucks and wheeled skids for handling molding boxes into the casting position are three important features, including the release of overhead cranes by installing simple jib cranes to serve a molder's working site or a fettler's or grinder's bench.

Production machinery can be installed to a greater extent than at present and with more attention to its labor-saving aspect. Production of molds by machines is dependent largely upon the nature of the market, but it is not unlikely that many of the patterns at present molded by hand, because the castings are ordered in small lots at a time, are really sufficiently repetitive to justify mounting for machine production, provided care is taken to organize machine production to deal with small lots. Immediate examination of the repetitiveness of their work would almost certainly show British Steel founders that a larger proportion of the castings they make can be produced by molding machines.

In the cleaning and finishing stages of the work, large airless shotblast machines, much larger than the average seen in Britain, help the American steel foundries to clean castings with the minimum of labor, and ex-

(*Concluded on page* 178)

Veterans of Norton Co. Hold Outing

MEMBERS of the 25-Year Club, Norton Co., Worcester, Mass., held their annual outing in August at the farm of George N. Jeppson, board chairman of the company. Twenty-five year veterans total 670 and make up 16 per cent of the Norton working force of 4300 at the Worcester plant.

This year, 61 new members were admitted to the club at ceremonies which included awarding of gold medals and framed certificates. In addition, 18 members received gold watches in recognition of 35 years of service. Thirty-five year men number 107 and nine men have been with the company fifty years.

Shown above, left to right are: Ralph F. Gow, executive vice president; Allan Bonnell, receiving his 25-year medal and certificate from President Milton P. Higgins, and George N. Jeppson, chairman of the board.

Mexaloy Super Refractory Saves Linings and Equipment

Tough, non-fusible protective lining for ladles, spouts, runners and cupolas

Mexaloy is the ideal material for protecting refractory linings of cupolas, ladles, runners and spouts in both foundries and steel plants. Mexaloy makes the body containing it highly resistant to sudden, violent temperature changes and thus avoids spalling and cracking of the refractory. Practically infusible, it will not melt or change its character under the action of molten metal. Neutral and chemically inert, Mexaloy's presence insures resistance to fluxing and corrosive action by molten metals and slags. It provides a low-friction, surface which allows no foreign body adherence.

Mexaloy is extremely easy to apply. Mixed with clay, ground fire brick and water according to a simple formula, the resulting mixture is easily applied by tamping. Linings containing Mexaloy last longer. For example, in the spouts of open Hearth furnaces where the usual loom layer has to be replaced after every one or two heats Mexaloy linings invariably last more than 10 heats—sometimes as many as 30. In Foundry cupolas Mexaloy linings last longer and improve metal quality.

To greatly reduce "shut downs" in your steel plant or foundry due to refractory replacements, it will pay you to use Mexaloy. Write today for further information.

Mexaloy

THE UNITED STATES GRAPHITE COMPANY • SAGINAW, MICHIGAN

DIVISION OF THE WICKES CORPORATION

(*Concluded from page* 176)

ternally operated air-driven shotblasts using full-pressure air are more effective than those used with reduced pressure because of being manually operated. Early experiments with large airless shotblasts and the external operation of shot nozzles, and demonstration to the industry of the results obtained, can effect important increases in productivity.

Steel melting equipment in America brings down the steel much more quickly than British equipment, because of the high power input. Here British steel founders are under the handicap of restricted availability of power. The obvious recommendation to increase the power-rating of arc furnaces cannot be generally applied until the lag in power supply has been overcome, but it would seem wise that one or two foundries should investigate the savings to be obtained in this way, so that the experimental work will have been completed by the time power is available. Apart from the saving of time by high power input, saving of power consumption is made in America by means of improved electrode control. Many existing arc furnaces in Britain are equipped with out-of-date electrode control and deserve to be re-equipped.

Accept Standardization

The degree of specialization by U. S. engineering companies in order economically to supply the immense home market joins with the American willingness to accept standardization so as to encourage specialization by steel foundries and to give them long production runs. The price range list shows also that repetitiveness is rewarded by a lower price for quantities.

The British market is much smaller, and a great deal more varied. Even with equal keenness for standardization of components, it is not to be expected that the same long production runs could be established in British steel foundries. But British engineers are not fools. They know perfectly well that in their factories they can tool up to reduce costs on long runs and, if they can gain advantages in price for production runs, they will not be slow to take advantage of that added weapon in their fight for the export markets.

But the present price policy of the British steel founders does not include regular price reduction for quantities. Until it does a powerful inducement to standardization of components will be lacking. Moreover, without the development of a market which demands production runs, the extremely good machine-molding practice existing in many British steel foundries cannot be extended.

The outstanding points of production techniques observed in America are fully reported either in the body of the report or in the appendices, and there is no call to repeat the references. Note should be taken, however, of several of those which, in the opinion of the Team, have a marked effect upon production, and can be adopted with advantage by British steel foundries.

Steelmelting. The practice of charging arc furnaces which have no top-charging device by using charging chutes is a valuable time saver. The furnace is tipped forward and the charge, which consists of heavy, short scrap contained in a long chute-shaped skip, is slid in through the charging door. Equipment is simple, and the technique easily acquired.

Molding. Extensive use of snap flasks effects economies, not only in outlay of boxes, but by accuracy of register which avoids loss through cross-jointing. Bottom-boards are essential, and molds require slip jackets at the time of casting. The technique requires developments from small to larger boxes.

Sand. Such extensive sand research is already carried out in Britain that it may seem strange to include this as an item of recommendation, yet the effect upon strip and fettling of using fine-grain sands is so evident in America that special attention to the finer ranges of grain size may repay the trouble involved.

Method. Effective use of Washburn cores is widespread in America. Their use is known to some steel founders in Britain, but extends slowly. There is need for more effective means of distributing technical data in simple form, so as to enable new methods to be introduced without prolonged experimentation in each foundry.

Exothermic compounds in heads. The economics of Risotherm types of exothermic compounds in short, open heads require study. If justified, this type of material ought to be made available in Britain.

The urgent need for *effective* research on steel founding problems in Britain is now fully recognized, and need not be stressed here. What ought to be stressed is the paramount importance of having the right type of man to convey to the steel founders themselves what is already known, as well as the results of researches and precise recommendations for their practical application. Steel founders are accustomed to the air of the foundry. They cannot breathe the rarefied atmosphere of the mountain-tops of scientific investigation. They need a Moses to come down from the mountain-top with commandments, simple rules embodying the conclusions reached from complicated data and investigation. The personality of the leader of research in the industry is of even greater importance than the quality of the research itself.

There is also room for a readier discussion of steel foundry problems among the lower supervisory grades. Meetings of the Institute of British Foundrymen do not at present quite meet the requirements of giving them opportunity to have free unreported talks of a completely informal nature, and there is, unfortunately, less ability among British foundrymen to say clearly what is in their minds than appears to be the case in America.

Finally it is the wish of the Team to make abundantly clear their belief that, given the spirit which desires high productivity and values for achievment, British steel founders will be not one whit less ingenious and resourceful than their opposite numbers, our good friends the American steel foundrymen.

Book Review

Elementary Metallurgy and Metallography, by Arthur M. Shrager, cloth, 297 pages, published by the Macmillan Co., New York. Price $4.75.

This book has been designed primarily as a text for the technical high school student who has a background of one year of physics and one year of chemistry. The author is a teacher in the department of industrial processes, Brooklyn Technical High School, Brooklyn, N. Y.

The text undertakes to cover an exceptionally wide field under the following headings: Structure of metals; slip, plastic deformation and recrystallization; alloys and constitutional diagrams; structure of iron and steel in the solid state; iron ore, chemistry in metallurgy of iron and steel; production of pig iron; cast and wrought iron; steel; bessemer; open hearth; electric arc furnace; ingot practice; working, shaping and joining iron and steel; heat treatment, annealing, hardening and tempering of steel; surface hardening; alloy steel; copper and copper alloys; aluminum and aluminum alloys; magnesium and magnesium alloys; zinc; control and testing; and foundry practice. A bibliography and glossary are included.

→ McKEE centrifugal blowers

"ROBUST" ROTOR

Typical of this blower's substantial construction is the sturdy rotor; a hub of high tensile bronze, blades punched from heavy steel — with edges flanged for greater strength — and each blade double-riveted to hub.

for FUEL-FIRED FURNACES

McKee Centrifugal Blowers provide a reliable, economical source of pressure air for the combustion of gas and oil.

Due to a minimum of wearing parts, upkeep and service expense are negligible. Because current consumption drops promptly with reduction in air requirements, operating cost is low. Heavy, durable construction assures minimum vibration and long life.

For air requirements from 2 oz. to 2 lbs., where steady air pressure is required at all times, McKee Blowers do an outstanding job. One blower will supply air to several furnaces or burners.

Write for Bulletins K-100 and K-110. Representatives in all principal cities.

Eclipse Fuel Engineering Company
ROCKFORD **ILLINOIS**

McKee Eclipse

INDUSTRY Briefs

BROWN Foundry Corp., 2200 Washington Ave., Philadelphia 46, newly organized, has acquired the foundry and equipment of Phosphor Bronze Corp., same address, and will continue to operate the 75-year old business. The company's line of nonferrous castings and products will be expanded to include aluminum castings. Original personnel of Phosphor Bronze will be retained, with William G. Brown, operating executive.

* * *

Lycoming and Spencer Heater Divisions, which formerly operated as individual units in Williamsport, Pa., have been integrated into a single operating unit to be known as the Lycoming-Spencer Division of Avco Mfg. Corp., New York. S. B. Withington, recently elected vice president of the parent company, will be general manager of both plants. Lycoming produces engines for commercial, military and personal aircraft, and Spencer Heater operates a large gray iron foundry.

* * *

The Budd Co. is building a new foundry in northeast Philadelphia. The 120 x 360-ft, one-story brick building will cost approximately $1,500,000. The plant is expected to be in production in the spring and will employ between 400 and 500 workers.

* * *

Powermatic Ventilator Co., 4019 Prospect Ave., Cleveland 3, manufacturer of industrial ventilating equipment has changed its name to Iron Lung Ventilator Co.

* * *

Rotor Tool Co., Cleveland, has appointed Russell & Olson Co., 15815 James Couzens Highway, Detroit 21, agents for the Detroit-Toledo and Michigan areas. Joseph Richards, Rotor Tool representative in the Detroit area for the last 5 years, will be associated with the Russell & Olson Co.

* * *

Simonds Abrasive Co., Philadelphia, has opened branch offices with warehouse stocks of grinding wheels and abrasive grain at 8829 Hubbell Ave., Detroit, and 1350 Columbia Road, Boston. Local stocks and service from these points supplement the service of established industrial supply distributors.

* * *

Link-Belt Co., Chicago, formally opened a new manufacturing plant at 3203 South Wayside, Houston, Tex., on Sept 27. The new structure houses a two-story office section and a one-story plant containing a machine shop, structural steel shop and warehousing facilities.

* * *

George H. Zirker, metallurgist and foundry consultant, 210 East 68th St., New York, has become manufacturer's agent for Foundry Services Inc., New York, fluxes; Pyrometer Instrument Co., Bergenfield, N. J.; and the Lanly Co., Cleveland, drying ovens.

* * *

Clark Equipment Co., Buchanan, Mich., formally opened a new factory at Jackson, Mich., on Sept. 24. The new plant represents the major undertaking in the company's overall expansion program and will produce transmissions, farm tractor drives, gears and forgings.

* * *

Waukesha Foundry Co., Lincoln Ave., Wauskesha, Wis., is producing castings from a new nickel alloy said to have a tensile strength of 50,000 to 60,000 psi, elongation of 7-10 per cent and a brinell hardness of 145-165 (3000 kg. load) in the as-cast condition.

* * *

J. W. Dice Co., formerly located at Grand View-on-Hudson, N. Y., has moved to 1 Engle St., Englewood, N. J. The company markets industrial and laboratory nondestructive test instruments.

* * *

Foundry Division, Enterprise Foundry Inc., 1123 East B St., Belleville, Ill., closed since May, has resumed operations.

* * *

Bay State Abrasive Products Co., Westboro, Mass., has moved its Detroit branch office and warehouse to 880 Lawndale Ave., Detroit 9.

New Tool Plant Houses Complete Foundry

CHICAGO Pneumatic Tool Co.'s new plant at Utica, N. Y., is nearing completion. The main building, which is over 1/5-mile long, houses tool production facilities, while separated from the main structure are buldings for the forge shop, plating shop, power plant, and foundry. The latter is said to one of the most complete nonferrous foundries to be found in an industrial plant. The sand handling equipment and core oven installations are almost entirely mechanized.

Each division has its own air-conditioned sound-proofed physical, chemical, and metallurgical laboratories and experimental shops. Overhead conveyors, modern lighting, an auto-dial PBX telephone system, photographic darkrooms, a 500-seat cafeteria, first aid rooms, and recreation areas are said to be the last word in industrial planning.

YOU DON'T HAVE TO BE A

Detective...

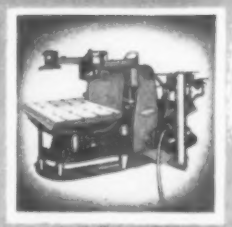
TO KNOW THAT YOU HAVE TO

MODERNIZE YOUR OPERATIONS

Better casting in less time at lower costs is possible with laborsaving foundry equipment. Davenport Molding Machines will save you man hours—will lower scrap losses—and give you a better profit.

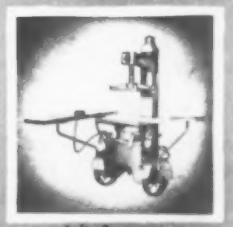
Let us send you our complete catalog showing the wide range of sizes and the many outstanding features of Davenport Molding Machines.

Jolt Rollover Draw, Model A

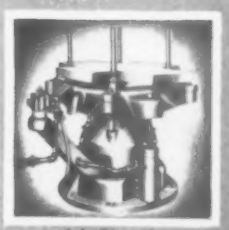


Jolt Rollover Draw, Model SA

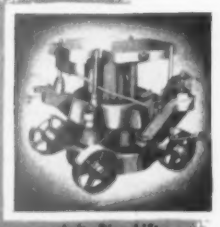
Jolt Squeeze, Model 10-JX (stationary)



Jolt Squeeze, Model 10-JX (portable)



Jolt Pin Lift Model AJS (stationary)



Jolt Pin Lift, Model AJS (portable)

DAVENPORT MACHINE AND Foundry Company

DAVENPORT IOWA U.S.A.

CANADA:
Canadian Foundry Supplies & Equip. Ltd.
Toronto and Montreal

REPRESENTATIVES
FRANCE • BELGIUM • HOLLAND • LUXEMBURG • SWITZERLAND
Ph. Bonvillain & E. Ronceray, Choisy-Le-Roi
Rue Paul Carle, Seine, France

ALL OTHER FOREIGN COUNTRIES
R. K. Price Associates, Inc.
70 Pine St., New York 5, New York, U.S.A.

Selecting and Evaluating FOUNDRY SUPERVISORS

By RICHARD S. SOLOMON
Consulting Psychologist
Dayton, O.

IT has been only within fairly recent years that the foundry has become interested in personnel selection and evaluation from a scientific standpoint. Modern techniques and methods of psychological analysis, however, are beginning to be applied. A perusal of the literature appearing in publications devoted to the foundry industry reveals a multitude of information on production problems, processes, new techniques and research in these fields, while the man who runs the machine or is responsible for supervision, which we believe is one of the greatest assets in any business, has not been properly evaluated.

There are inherent difficulties in the foundry industry which perhaps have delayed this procedure which is fairly well advanced in other types of businesses. In the first place, as we have indicated, the additional emphasis has long been on the machine and the process, as well as the materials, rather than on the man behind these factors. Secondly, there has been some hesitation to approach this problem of personnel evaluation from a technical, psychological standpoint, due to difficulties in applying the standard techniques. The average educational level of the foundry worker has discouraged the use of traditional paper and pencil tests. Somehow there has been a fear of alienating the employee by testing his power of concentration, since his greatest asset has been traditionally considered to be his physical ability and stamina in production.

Thirdly, rigid rules of seniority have also delayed the beginning of scientific selection, since many times promotion from within has been thought to be virtually automatic or confined to a very narrow limit of choice.

None of these apparent reasons is valid. In fact, the need for scientific selection and evaluation is more crucial under these conditions. This is especially true at the supervisory level, since the potential supervisor to choose from when a promotion is being made relates back to the type of employees who were originally selected for lower rated jobs. Then too, many foundries have had the prerogative to use the "ability" factor in conjunction with seniority in making promotions to supervisory level positions, but often have not availed themselves of this opportunity.

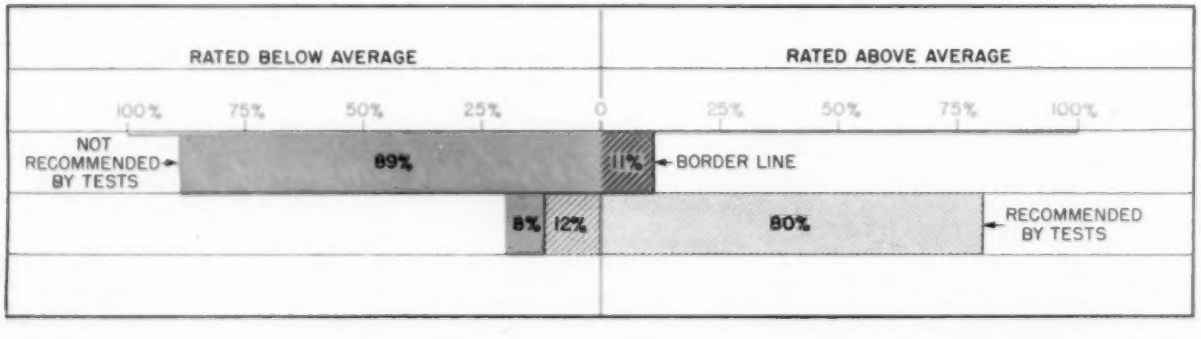
Recently the writer has acted as a consultant to the Dayton Malleable Iron Co. and its G. H. R. Foundry Division in developing a workable and effective method of selection. The results to date have been exceptionally encouraging as applied to the supervisory and foreman group. The same methods are being applied to all foundry personnel with specific changes to fit the requirements of each level. As a matter of fact, whereas some studies of this nature have been initiated at the lowest level, we have found it important to begin at the top. Even before the supervisory group was tested psychologically, almost the entire executive staff of the organization, including the president, vice president, general manager and works manager, was subjected to the same procedures. This was important to establish acceptance of the program on the lower levels.

Another fundamental assumption which has proved helpful is that the basic characteristics and abilities of supervisors in the foundry are not essentially different from those of supervisors in other industries. This point of view has often been contradicted, if not on the basis of supposed fact, then in practice. There is no reason to believe that factory supervisors and foremen have unique characteristics which other human beings do not possess. The essential job is to check on what these characteristics are and also to determine the degree and particular combination in which they exist in superior supervisors as contrasted with those that are known to be below average.

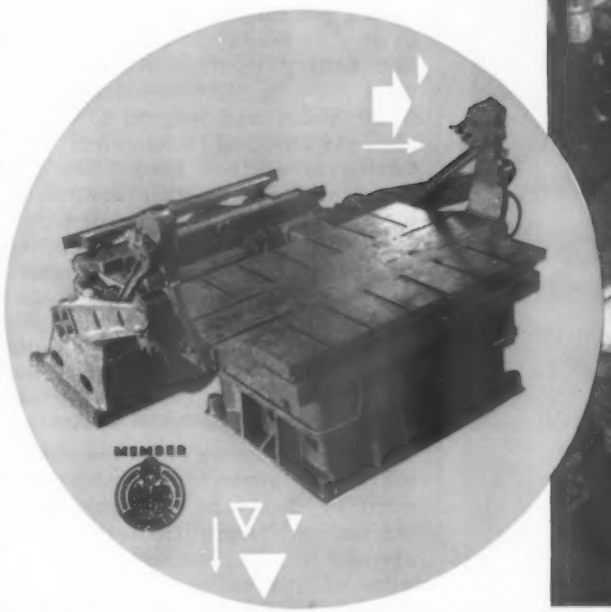
In order to accomplish this, the entire supervisory group at the G. H. R. Foundry Division in Dayton was administered standard psychological tests, including measures of mental ability, social intelligence, clerical

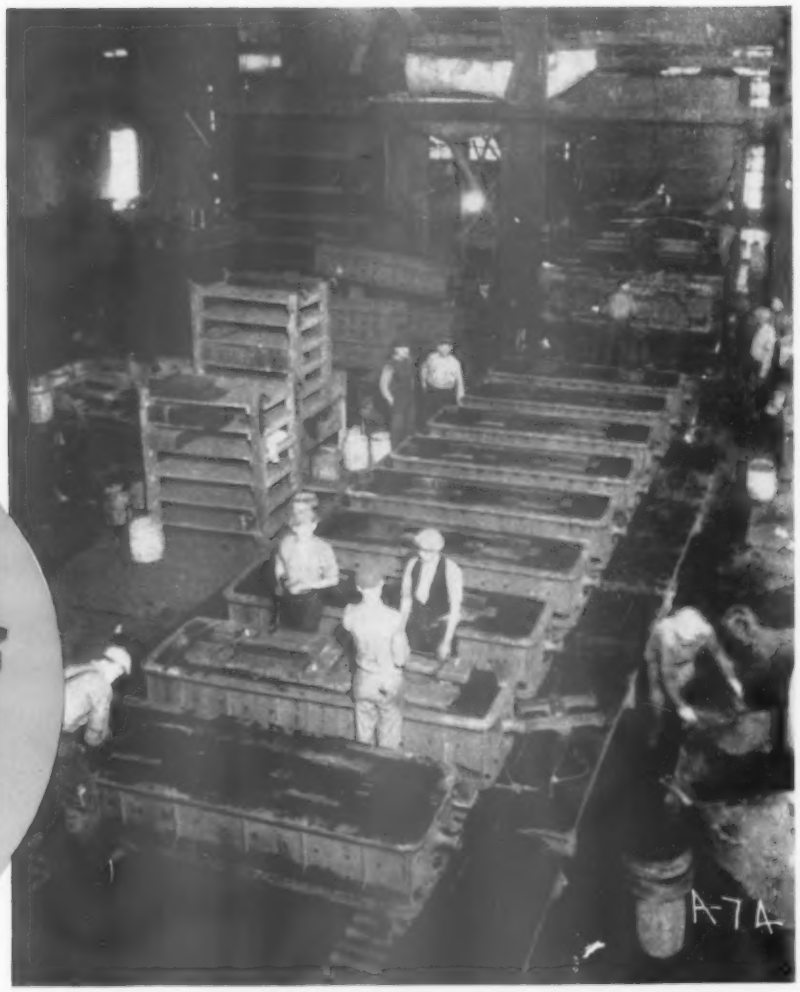
(*Continued on page* 184)

The accompanying chart shows how supervisors would have been recommended on the basis of test factors alone without consideration for other known facts about each individual



Birdsboro Steel Foundry & Machine Co.
Birdsboro, Pennsylvania





THIS FOUNDRY IS A GOOD PLACE TO WORK

This modern foundry, constructed of steel and glass, and employing 1300 people, is designed to produce a large variety of steel castings including railroad side frames and bolsters, marine castings, hydraulic press equipment, etc.

It is a highly mechanized plant with floor conveyors for moving molds and overhead apparatus for sand handling equipment.

Three 30-ton acid open hearth furnaces are used. Production of finished castings averages 70 tons per 8 hour day. Machine shop, offices and foundry cover 10 acres.

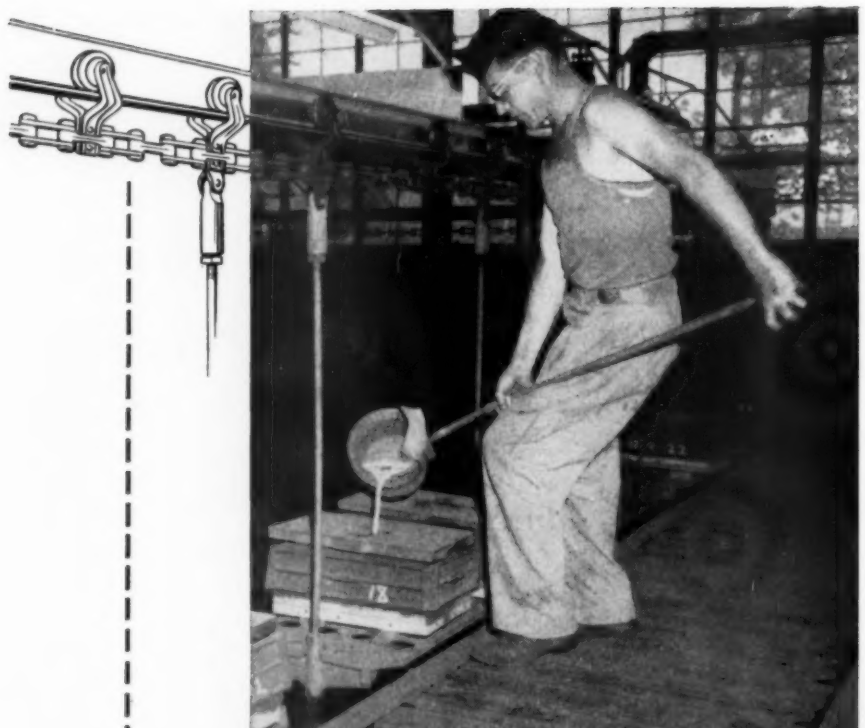
It is a good place to work for many reasons including the most modern lighting arrangement obtainable; an emergency hospital with a nurse on duty at all times; and a full-time safety engineer to check on job hazards.

Outstanding among the many Herman molding machines used in this plant are the two 10,000 pound capacity machines that have produced hundreds of thousands of railroad side frames and bolsters. Their performance is typical of the rugged construction and dependability of *all* Hermans, no matter what capacity machine is used.

Remember that on all Hermans no power is required for the roll-back operation; one rotary valve handle controls the complete operation; there is pressure lubrication to each moving part; and *they've made their way by the way they're made*. May we hear from you?

Herman MOLDING MACHINES

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH, PA.



WEBB Foundry Conveyors Are "Built-In" to the Job...

. . . and are engineered, fabricated and installed by a competent and thoroughly experienced organization.

The illustration shows a typical Webb foundry installation. Molds are carried on an overhead conveyor system to the pouring station; a slat conveyor at proper pouring level travels at the same speed, providing a stable pouring platform. This is just one of the many effective conveyor combinations that can be used to cut foundry operating costs.

5237

Our representatives will be glad to call on you to make specific recommendations for your requirements.

JERVIS B. WEBB COMPANY

8951 ALPINE AVE.
DETROIT 4, MICH.

OFFICES IN PRINCIPAL CITIES

CONVEYOR ENGINEERS AND MANUFACTURERS

(*Continued from page* 182)

proficiency, and personality traits. (It will be noted here that the factors of experience and mechanical "know-how" acquired through experience are not crucial factors, nor are they considered basic at the supervisory level as far as the tests themselves are concerned. These factors are determined through other types of measurement and appraisal.)

The entire group comprised 47 individual supervisors, ranging in age from 24 to 59, with length of tenure on the job ranging from one month to over 20 years. In addition to the test battery itself, each supervisor filled out a detailed personal history blank, which was designed to supply key psychological information pertaining to attitude toward the job and the company, other motivating interests, background of experiences and aplication to the job itself, as well as other factors. The information obtained from this blank was integrated in the interpretation of each individual, with the test results themselves.

Rated by Independent Judges

After the testing was completed, the entire supervisory group was rated by three and sometimes four independent judges from the management of the company. The results of the ratings provided the information for the basis of selecting from the entire group, those who were judged to be superior as supervisors and those who were judged to be below average, taking into consideration all factors on the job.

The results of the tests, when applied independently to the superior and then to the below-average group, reveal the following differences in favor of the superior group:

Test	Per Cent Difference	Effectiveness of Individual Test, Per Cent
Mental Ability	54	99+
Social Intelligence	34	98.9
Clerical Ability	48½	99.4
Personality Traits		
Extroversion	38	99.4
Dominance	30	97
Self Confidence	27	97
Social Independence..	—21	92

It will immediately be seen that every test in the battery selected distinguishes between the superior supervisors and those considered below average. They form a hiring standard which gives a basis for predicting future success in supervisors in the foundry with a considerable improvement over chance. The complete statistical procedures, as well as findings, are not discussed here. The final results are given only, but these have of course been subjected to rigid statistical controls and appraisal.

In practice it is not advisable to base selection or evaluation of a supervisor on any one test factor alone. Rather, the entire battery should be used as a pattern and integrated with other known facts about each individual. When this is done, we have demonstrated that the test factors used as a pattern will distinguish between the above-average and below-average supervisory groups, as indicated by the accompanying chart.

The chart indicates that if we had not known anything about the ability of the individuals concerned, apart from our test findings, on the basis of the test findings alone we would not have recommended 89 per cent of those supervisors now considered to be below average; we would have recommended as borderline possibilities for supervisory work only 11 per cent of this group.

On the other hand, we would have recommended 80 per cent of the supervisors considered to be above average, 12 per cent as borderline, and only 8 per cent of this group would not have been recommended. These findings represent very clear-cut distinctions of what can be accomplished by the use of psychological testing techniques and methods properly selected, administered and interpreted. To obtain maximum benefits, such a program must be consistently applied over a period of time. The work is now progressing on a similar basis with the employees at the general factory level, the results of which will be reported on at a later date.

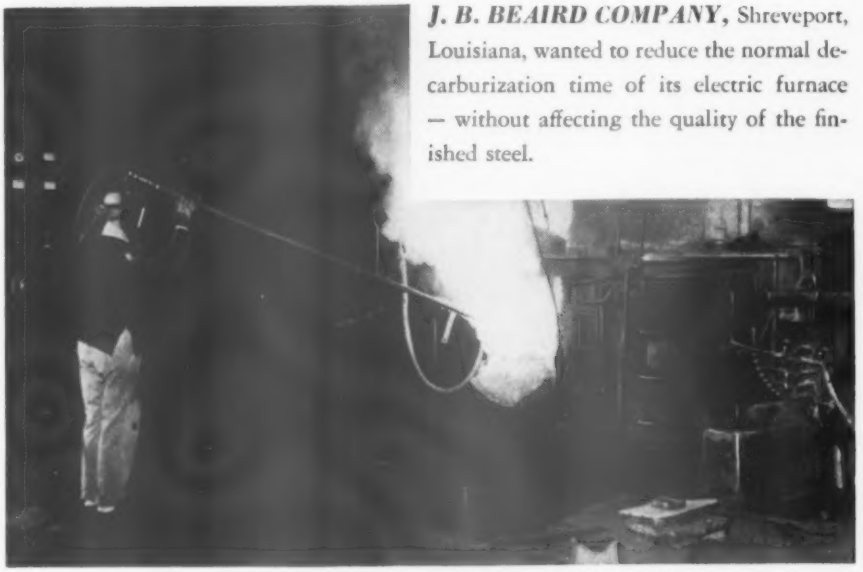
Book Review

Engineering Laminates, edited by Albert G. H. Dietz, with 24 contributing editors, cloth, 797 pages, published by John Wiley & Sons Inc., New York. Price $10.

Anyone interested in the design, fabrication or use of engineering laminates will find much of value in this volume. The text includes detailed information on laminates of essentially one class of material, such as wood or metal, and composites of several widely different materials. It also considers composites of essentially the same density throughout, and composites of lightweight cores and strong skins. Laminates in which the surface coating is only a protective coating have been omitted.

The first two and the last chapters are of general interest. The first chapter discusses the general mathematical theory of applied mechanics of laminates. The second chapter considers adhesives and this is followed by chapters on glued-laminated wood and plywood. The patternmaking industry should find material of interest in these chapters.

Oxygen cuts electric furnace decarburization time . . . saves power



J. B. BEAIRD COMPANY, Shreveport, Louisiana, wanted to reduce the normal decarburization time of its electric furnace — without affecting the quality of the finished steel.

George Bellew, Airco Technical Sales Representative, was called in to determine what effect the introduction of oxygen in the molten bath would have on refining time. In each of the three trial "heats" oxygen was run just below the slag metal interface.

Several of the advantages of using oxygen in these "heats" were: greater alloy recovery . . . reduced time and power consumption . . . electrode cost per ton lowered . . . elimination of ore handling and storage . . . increased melting rate . . . increased bath temperatures . . . faster carbon elimination.

To date the J. B. Beaird Company has conducted tests on 200 more "heats" — and is highly pleased with the results.

The use of oxygen for decarburization has now become standard practice.

• • • •

TECHNICAL SALES — ANOTHER AIRCO PLUS-VALUE FOR CUSTOMERS

To assure its customers of high efficiency in all applications of the Oxy-acetylene flame or electric arc, Air Reduction has available the broad, practical experience of its nationwide Technical Sales Division personnel. The collective experience and knowledge of these specialists has helped thousands to a more effective use of Airco processes and products. Ask about this Airco "Plus-Value" service today. Write your nearest Airco office. (In Texas: Magnolia Airco Gas Products Company . . . On West Coast: Air Reduction Pacific Company).

AIRCO **AIR REDUCTION**

Offices in Principal Cities

Headquarters for Oxygen, Acetylene and Other Gases . . . Carbide . . . Gas Cutting Machines . . . Gas Welding Apparatus and Supplies . . . Arc Welders, Electrodes and Accessories

ROTARY
R-C Blower and Gas Booster mounted on same bedplate, with V-belt drives from 5 HP motor. Capacity, 125 CFM.
ONLY R-C dual-ability GIVES YOU dual choice
CENTRIFUGAL
Type OI Centrifugal Blower, with capacity of 11,750 CFM, direct driven by 200 HP motor.

When it comes to choosing between Centrifugal and Rotary Positive Blowers and Exhausters, you'll get impartial suggestions from R-C *dual-ability*. That's because we build both —and we are the only blower manufacturer who gives you the benefit of this *dual choice*.

Another advantage of consulting us results from our wide range of units of both types. If it's 10 CFM you need, we'll supply it. Or, if your use calls for extremely large volume, we build them to any desired size.

One more point—air or gas handling equipment is our "bread and butter" . . . we have no other business. That means detailed and *interested* attention to your requirements from an organization that has specialized on that job for almost a century.

ROOTS-CONNERSVILLE BLOWER CORPORATION
911 Madison Avenue, Connersville, Indiana

ROOTS-CONNERSVILLE BLOWER BUILDERS R-C SINCE 1854

BLOWERS • EXHAUSTERS • BOOSTERS • LIQUID AND VACUUM PUMPS • METERS • INERT GAS GENERATORS

* * ONE OF THE DRESSER INDUSTRIES * *

CLEANING UP THE FOUNDRY

(*Continued from page* 87)

on luminaires, relocation of light sources, and adjustment of brackets and fixtures.

7. Spot lights used for accident prevention purposes. Light directed onto low ceilings and other danger spots, draw attention to the hazard and reduce possibility of accident.

8. Luminaires arranged so that they may be cleaned and washed without danger to maintenance workers. If light fixtures are inaccessible, they will less likely be cleaned than if they are readily available. Consequently, suitable safety ladders, elevated platforms, gangways on overhead cranes should be provided or special light fixtures, which can be lowered from the floor, should be installed.

9. Light bulbs, fluorescent tubes, mercury vapor lamps are replaced according to set schedule, either a few at a time at set weekly or monthly periods or en masse a few times a year. In the former instance, only burned-out lamps are replaced; in the latter, all lamps, regardless of their condition, are replaced at once. The saving in labor cost often makes up for the waste necessary when all lamps are replaced at one time.

Light Shows Up Dirt

Because dirt is more visible and carelessness on the part of the worker more apparent when illumination is good, lighting serves as incentive to greater cleanliness. If dirt and disorder are hidden in shadows and covered by dim lighting, they are rarely rectified.

In recent years more has been written on the value of paint and color than on many other subjects connected with industrial operations. Surprising powers have been attributed to color and paint; the dangers of the *wrong* colors have been given much play. In reality, color has an important job to perform; however, its role should not be overstressed. Matthew Luckiesh, called "the father of the science of seeing," presented clearly the role that color can and can not play in industry when he declared that the "powers of color are relatively weak when compared with many other influences . . . However (these powers) are practically universal and . . . the proper ones may be harnessed for what they are worth." Mr. Luckiesh undoubtedly had in mind the associative values

of color. Blues and greens look cool, whereas red and oranges connote warmth. A furnace room, heat treating department, and casting shop, when painted in those colors toward the blue end of the spectrum, will actually seem to be more comfortable.

Another factor is the effect of various colors on spacial relationships. Red, being of shorter wave length than other colors, seems to advance; blue, at the other end of the spectrum, seems to recede. Crowded quarters can be made to appear larger and roomier by the simple expedient of painting them in the receding colors. Of course, a room can be painted the deepest of blues and still not be a whit larger in actual dimensions; however, it will appear to be more spacious. When speaking of the reflective powers of color, there is considerably less psychology and much more reality. White does reflect twelve times as much light as dark green, light green does have more than double the reflective power of dark gray. These figures can readily be checked. The reflection power of different paint finishes, worked out by the Illuminating Engineering Society, are listed below:

Color	Per Cent of Light Reflected
White	85
Light	
Cream	75
Gray	75
Yellow	75
Buff	70
Green	65
Blue	55
Medium	
Yellow	65
Buff	63
Gray	55
Green	52
Blue	35
Dark	
Gray	30
Red	13
Brown	10
Blue	8
Green	7

The relation between painting and lighting is obvious. The same system of lighting will produce vastly different results, depending on the type of color used for room interiors. Painted dark gray ir brown—or having an unpainted brick wall surface—the room will soak up light like a sponge does water. In evaluating the reflective powers of color, it should be remembered that highly reflective colors produce harmful glare and should be used with caution. Since glare, by definition, implies harmful light *within the field of vision,* highly reflective colors such as white, light gray, etc. are used on ceilings and other areas outside the field of vision.

Ordinary Shot and Grit

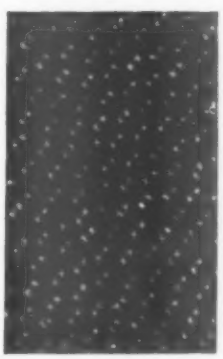
20th Century Normalized

LASTS (AT LEAST) twice AS LONG

20th CENTURY NORMALIZED

Reduces Cleaning Cost Amazingly

REDUCES FREIGHT AND HANDLING TO ONE-HALF



20th Century Normalized Shot and Grit are stress relieved.

There is practically no shattering.

They add greatly to equipment life. *Wear and maintenance is reduced at least 50% to 75%.*

IMMEDIATE SHIPMENT all screen sizes.

THE CLEVELAND METAL ABRASIVE CO.

Main Office and Plant: 887 East 67th Street, Cleveland 8, Ohio
Howell Works—Howell, Michigan

Wall surfaces, table tops, containers, furnaces, and other machinery within the field of vision are painted medium colors with satisfactory reflective power but with no appreciable glare. Dark, light-absorbent colors are employed for floors, equipment and other objects that are likely to become soiled quickly. Hundreds of color schemes have been worked out for all types of plants and work areas; however, in selecting the particular color scheme for a given foundry, there is still wide latitude for individual taste and preference. Factors that should be considered are as follows:

1. Color and paint are used not only for appearance and lighting purposes but also to identify equipment and point out hazards. Thus, in accordance with ASA standard Z53.1-1945, *red* identifies fire protection equipment and apparatus, warns of danger, and indicates stop; *yellow* designates caution and points out physical hazards such as edges of platforms, low-hanging obstructions, material handling equipment, etc.; *green* designates safety and first aid equipment; *black and white,* individually or in combination, indicate housekeeping and traffic markings.

2. Ceilings are painted white, aluminum or some other light color. This is a good general rule to be followed almost without notable exception.

3. Paint, once applied, is properly maintained by periodic washing and cleaning.

4. Cranes, hoists and other overhead parts are painted in colors which contrast with the rest of the room so that they are readily visible.

5. Where feasible, lockers, washroom facilities, and other plant properties are painted in colors other than the inevitable green.

6. Except for purposes of identification, pure colors should be avoided and shades and tones used in their stead. It is of interest to note that in creating a color scheme, chances of success are infinitely better if pure colors are avoided. It is almost impossible to come up with clashing, unattractive color schemes if shades and tones are used.

7. Walls and other brick surfaces are plastered before painting to facilitate subsequent cleaning and washing. The exposed brick surface is difficult to paint properly and even more difficult to keep clean.

8. Handles on locker doors, drawers, and other areas that are handled frequently are painted black or a dark color to hide grease and dirt from workers' hands.

9. Skids, containers, tools and other properties belonging to individual plant departments are painted distinctive colors which identify their department-owners. This insures that greater attention will be paid to the care of such property.

Well lighted and properly painted, the clean-up task in the foundry is well on its way to completion. However, before doors are flung open to the public, steps should be taken to avoid a particular type of corrosion which transforms a freshly painted wall into an area of dirt and grease; it detracts from the usefulness of lighting, and introduces disorder. This deteriorating agent is brought about by poor housekeeping and faulty maintainance. Although used interchangeably, the words have different meanings. A foundry can be washed and dusted and kept spotless—that's good housekeeping. Should the freshly washed floor have deep ruts, the painted ceiling about to cave in, and washed windows cracked and broken—that's bad maintenance. One without the other is rather pointless. Good housekeeping is perhaps as self-evident a phrase as can be found. The foundry must be cleaned and washed and scrubbed just as a housewife would do in her home. In addition to proper equipment, suitable sanitation measures, and the like, the following check list introduces other factors which should be given consideration:

1. Good housekeeping is a dual task in which both management and workers must do their share. To implement this, housekeeping tasks are assigned to each individual in the plant, from department head to lowliest trainee. Management's share is also definitely indicated so that the major work is done by plant maintenance crews; smaller jobs, like maintaining an orderly work place, replacing tools, cleaning up scrap and oil spillage, and the like are assigned to individuals.

2. Cleanliness and order is facilitated by installing trash containers, providing cabinets and lockers for tools, providing at the work station brooms and other cleaning equipment—in short, good housekeeping is made easy.

3. Washrooms which are well supplied with soap and hot water, shower stalls, clothes lockers, and other types of equipment for personal cleanliness are provided not only as a convenience to workers but also as a means for insuring clean work habits. A worker who leaves the plant clean, returns in the same condition next morning. Being clean himself, he acts accordingly on the job and keeps surroundings clean.

4. Good housekeeping is encouraged

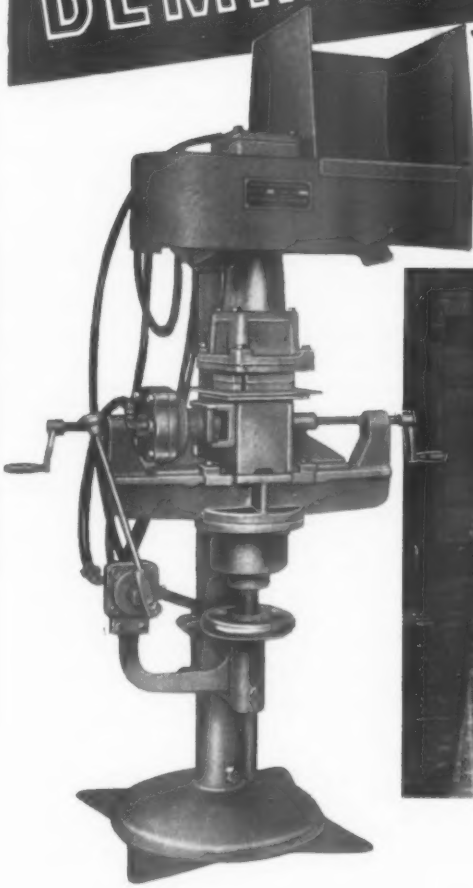
(*Concluded on page* 190)

WATER PUMP CASING cast in four parts at the Farrel-Birmingham Co. foundry, Ansonia, Conn., is made of high strength GM Meehanite iron and weighs 121,050 lb, the smallest of the four sections weighing 21,900 lb and the heaviest 36,200 lb. The casing is one of five units being furnished Worthington Pump & Machinery Corp. for 84-in. vertical volute pumps to be installed in the Tracy Pumping plant, Central Valley Project, California, to pump water for irrigational purposes

DEMMLER No. 55 CORE BLOWERS

CUT CORE BLOWING COSTS 30%

FOR PEORIA MALLEABLE CASTINGS CO.



Anna Gerhards and Dewey Rakestraw of Peoria Malleable Castings Co. are seen at their DEMMLER NO. 55's. Being blown are chain cores and ball type trailer hitch cores.

Here, indeed, is a real success story — one that every foundry can share.

It concerns Peoria Malleable Castings Co. of Peoria, Illinois, who, through the purchase of six DEMMLER NO. 55 Core Blowers, reduced their small core blowing costs by 30%!

Peoria Malleable Castings had previously used other makes of small core blowers, but now DEMMLER NO. 55's carry the load — efficiently and profitably.

Quality of cores produced by the DEMMLER machines, reports Peoria Malleable Castings Co., is excellent, being extremely uniform and far superior to that of hand made cores.

The experience of Peoria Malleable Castings Co. is not an isolated case. Hundreds of other foundries are also enjoying the "extra profits" DEMMLER NO. 55 Core Blowers make possible.

Are you one of them?

Features

- Ideal for short run jobs
- Quick, easy adjustments for raising table and moving chuck jaws
- Sliding, quick change blow plates
- Trouble-free diaphragm type blow valve
- Sand magazine and carriage of aluminum castings, with ball bearings
- Will accommodate boxes 9 inches long — handle cores weighing up to 4 pounds
- A single hand valve operates both vertical and horizontal core box clamps and blows the core
- Moderately priced

Write for Illustrated DEMMLER NO. 55 specification sheet — today!

Wm. DEMMLER & BROS.
KEWANEE, ILLINOIS

MANUFACTURERS OF CORE BLOWERS EXCLUSIVELY SINCE 1911

(*Concluded from page* 188)

by such promotional means as posters, publicity in plant newspaper, awards, and prizes. An effective procedure followed in one plant entailed the awarding of a derogatory banner to the department with the worst housekeeping record. This symbol is passed on to another and more deserving department when the occasion warrants.

5. Management's interest in good housekeeping is made abundantly clear. Far too often do workers feel that the "bosses" do not care whether or not the work place is clean. It is important that this erroneous belief be corrected by such positive measures as plant inspection by officials, letters of commendation from the president to the best departments, etc.

Suggest Maintenance Program

Of course, maintenance is a broad subject of considerable importance and can be discussed here only in terms of specific high lights as they relate to keeping the plant clean and orderly. These are:

1. Maintenance work—be it washing light globes, cleaning lavatories or tightening bolts—is done according to schedule so that each task is outlined, a time set for its performance, and the work done.

2. A system for checking maintenance work is instituted so that management is certain that all work is performed properly and on time.

3. Plant exterior checked periodically for the following trouble spots: Cracked or broken windows, defective skylights, corroded or defective ventilators, shifting or settling of platforms and other outdoor properties, damaged doors, fissures and open joints on walls, worn or dried-out roof coverings, weakened or corroded gutters and downspouts, leakage or disrepair of water tanks, poor bracing or electrical failings of signs, corroded fire escapes, etc.

4. Plant interior checked for corrosion of structural steel parts, chipping or cracking of concrete structural sections, rot and paint failure of wooden beams and supports, cracks in walls and sagging ceilings, surface failures of concrete floors, corrosion or disrepair of fire doors, worn or loose stair treads, poorly supported stairways, disrepair of elevators, etc.

5. Washrooms examined periodically and lavatory equipment cleaned and repaired daily. Basins, sinks and bathtubs cleaned with cleansers recommended by manufacturers and toilet seats washed several times daily with suitable disinfectants.

6. Platform scales, material handling equipment, cranes and other equipment checked and maintained on a set schedule.

Also of considerable importance are the following general measures, all of which contribute their share to disirable working conditions and an attractive plant:

1. Excessive noise reduced wherever possible by enclosing tumbling mills and other noisy operations, as shown in Fig. 4, using insulating materials on ceilings and walls, and closing off noisy areas from rest of shop by sound-proof doors.

2. Order and neatness are encouraged by the use of skid bins, pallets and other containers. Because these containers permit stacking and piling of materials and processed parts, congestion is relieved and plant appearance improves considerably.

3. Dust control is simplified by use of ventilated shakeouts, vacuum cleaning equipment instead of brooms and other devices which merely serve to redistribute dust.

4. Aisle markers, white or yellow strips painted on the floor to delineate aisles from work areas and storage space from other properties, not only add a note of orderliness but actually encourage free aisles, confinement of materials to prescribed areas, and in general aid in maintaining an orderly work place.

Sources of Illustrations

Figs. 1-2—Aluminum Co. of America
Fig. 3—Portland Cement Association
Fig. 4—American Brake Shoe Co.
Fig. 5—Westinghouse Electric Corp.
Fig. 6 — Electro-Alloys Division, American Brake Shoe Co.

Book Review

Steel and Its Heat Treatment, Vol. III, by D. K. Bullens, cloth, 606 pages, published by John Wiley & Sons, New York 16. Price $7.50.

The fifth edition of this work, dealing with engineering and special purpose steels, was prepared by the metallurgical staff of Battelle Memorial Institute. The text covers known facts about the more important alloy and special steels. Such steels as carbon, mild alloy, NE, SAE and tool are discussed.

One chapter is devoted to steel castings, and considers such factors as homogenization, intergranular films, composition, size effect in steel castings, cast carbon steels annealed and normalized, precautions in heat treatment, grain growth, copper cast steels, silicon cast steels, low carbon in cast steels for welding, high strength cast steels for welding, laminations of high alloy steel castings, cast NE steels, hardenability specifications, and utilization of steel castings.

Air compressors

(*Continued from page* 78)

air is no longer able to carry the moisture as invisible vapor.

Invisible vapor cannot easily be separated from air. It can be absorbed by silica-gel, or some such hygroscopic materials, but the process is costly.

It is easy and inexpensive to pass the compressed air through a heat exchanger, called an aftercooler, and absorb the heat from the air by water. The moisture is condensed into water, which can easily be separated from the air in a moisture separator, and the water removed from the moisture separator by a trap automatically, or by a valve manually.

A small amount of water is required by the aftercooler, about 1 to 2 gallons of water per minute per 100 cfm of air compressed to 100 psi. Then this water can be used to cool the compressor cylinders.

The maintenance on the aftercooler is simple. The small tubes must be cleaned occasionally. If the water is soft and not too acid, very little care is required. If the water tends to deposit lime or mud, the cleaning must be done more frequently.

Lubrication—Lubrication of the air compressor, or of any machine, is the most important factor of maintenance, and very directly influences the life and cost of operation of the machine.

Lubrication depends on two factors: 1. Getting the lubricant between the moving or rubbing parts. 2. Holding it there, which means using the correct lubricant.

The method of lubrication differs with the design and construction of the air compressor.

The older design, generally spoken of as the horizontal, slow-speed compressor, has a horizontal cylinder and the piston pumps air in both directions. The piston rod passes through a packing gland, or stuffing box, and the rotative motion of the crankshaft is transmitted to the piston rod by a cross head.

All of these points must be lubricated. The piston is usually lubricated through the intake air. Oil is fed, or allowed to drop into the intake air line, and is distributed over the entire cylinder wall by the air. The crank pin and main bearings are lubricated either by splash inside the enclosed crank-case, or oil is fed to the crank pin in some manner. It is important that the correct type

of oil be used for each service. The oilers must be filled at regular intervals.

The later design is either with vertical cylinders, or nearly vertical cylinders placed in the form of a *V* or a *W*. Some of these are cooled by direct radiation to the air and others have jackets for the circulation of water or some nonfreezing liquid. In both types oil in the crankcase is either splashed over all of the interior parts of the compressor, or is pumped by pressure to each of the bearings.

The clearances in these compressors are close to those of internal combustion engines, and motor oils are therefore preferred. The so-called compressor oils are not satisfactory in most of these machines. We have recommended the use of detergent oil in all of our compressors for several years. Detergent means cleansing, or scouring, and that is just exactly what a detergent oil does. It cleans all of the dirt from the oil lines, in back of the rings, and everywhere.

Detergent oil, furthermore, will not permit the deposit of carbon. It picks up and carries in suspension every bit of carbon that is formed in an engine or a compressor. This darkens the oil rapidly, but does not interfere with its lubrication value.

Use of oil filters is recommended by many, but the draining of the oil from the crankcase and flushing out of the crankcase regularly is more important. A filter will remove some of the dirt carried in suspension, but flushing out is the only method of removing the dirt in the bottom of the crankcase.

Cooling—The compression of air creates heat. When air is compressed to 1/14 or 1/15 of its original volume, the heat is sufficient to make oil burn. This is the source of ignition in a diesel engine. When air is compressed to 100 psi, sufficient heat is created to cause lubrication trouble, if none of the heat is absorbed from the cylinder walls.

The cooling system employed to do this is either direct radiation to the air, assisted by fins cast on the cylinder and heads, the so-called air cooling; or by the absorption of the heat by a liquid in jackets around the cylinder and heads, and then either throwing the heated liquid away or passing it through a radiator and absorbing the heat from the liquid by a blast of air, the so-called water cooling.

There is a point beyond which it is impossible or impractical to radiate the heat directly to the air, and when compressing air to 100 psi this is a

Modern Foundries
Don't Have
FUMES AND DUST

...they have
Schmieg
CENTRI MERGE

Available both as a floor-mounted type (shown) or an overhead installation. Complete with a motor-driven sludge removal conveyor, where required.

AUTOMATIC ELIMINATION
from Collection to Disposal

Operators of modern foundries have long since learned the economy of ridding their shops of destructive dust and smoke fumes. Men who work in foundries free of these health hazards feel better, work better, produce more. And the accident rate is lowered. In actual foundry operation, the Schmieg CENTRI-MERGE method of dust and fume elimination has shown marked advantages over any other system. Dust and fumes are collected *immediately they occur*—shot back on a stream of air through ducts to the Collection Unit. In the washing chamber of this unit—a veritable tornado of seething, churning water-dust is washed and scrubbed from the air and flooded into the sludge tank below, permanently trapped under water. Fumes go out the exhaust. AUTOMATIC operation from start to finish.

If you are interested in learning why the CENTRI-MERGE method is so highly endorsed by foundry owners and how its application can so greatly benefit your own operation, our engineers are prepared to give you some eye-opening information on dust and fume elimination—without obligation, of course.

THE *best* AIR PURGE is CENTRI MERGE

Schmieg INDUSTRIES INC.
Engineers & Manufacturers

302 PIQUETTE AVENUE • DETROIT 2, MICHIGAN

cylinder about 3¼ or 3½ in. in diameter. Similarly, there is a point beyond which it is impractical to liquid cool a compressor cylinder. The speed of operation of the compressor also is a factor.

The solution then is to compress the air part way in one compressor, remove the heat of this compression in an intercooler, and complete the compression in a second compressor. These two compressors are usually combined into one machine known as a two-stage compressor.

The same method is used to take care of the heat created by compression to higher pressures, but these are rarely needed in foundries. Pressures to 500 pounds can be created in two-stage compression; to 2500 pounds three stage, and so on.

The intercooler, like the aftercooler consists of a nest of tubes through which the air passes and over which water flows. The intercooler, like the aftercooler, must be cleaned if it becomes coated or clogged with deposited mud or scale.

Air Receiver — The air receiver must be drained, or blown down, every day. The air receiver itself is an important part of the compressor installation. It must be made according to the ASME and the National Board Codes for Unfired Pressure Vessels and must be inspected by a recognized insurance company for compliance herewith.

The air receiver must have an accurate air gage and a pop safety valve. The pop safety valve should be tested regularly. It must have a capacity larger than the compressor or compressors pumping into the system, and must be large enough when it pops to reduce the pressure to a safe pressure in a certain number of seconds.

Air Lines—One of the greatest sources of trouble in foundries, as well as in all shop installations, is the small air lines. Rambling air lines, lines that go all around the shop, are quite as bad.

Air lines should be large enough to carry the amount of air without drop in pressure. The best arrangement is to have a large main through the shop, and branch off for the various services. We suggest that when running a line, no couplings be used, but at the end of each length of pipe a tee be used. The outlets that are not needed can be plugged and whenever additional lines are needed the pipe does not have to be cut for the insertion of the tee.

It is also suggested, where an aftercooler and moisture separator is not used to furnish dry air, that the line be pitched in the direction of the flow of air, and that all leads that are taken off be taken off the top of the line. Any water in the lines will flow on by and reasonably dry air will be taken off the top. At a low point on the main line a drop leg can be inserted to catch the water, and it can be drained manually by a valve, or automatically by a trap.

Electric Motors — Frequently the source of power for the air compressor is an electric motor. This is a convenient source of power, but electric motors in the foundry are subjected to dust, which will, in time, destroy the insulation, and which can ruin the bearings. Periodic blowing of this dust from the motor windings will prolong the life of the motor. Weekly cleaning is good practice and is the rule in many plants.

The use of totally enclosed motors is recommended. A totally enclosed motor is not necessarily an explosion proof motor. It is one in which the main housing is totally enclosed and is surrounded by a second, outer housing through which a blast of air is forced by a fan.

The amount of power required to compress air depends primarily on the amount of air compressed and the pressure to which it is compressed. The condition of the compressor is, of course, a factor.

Diesel engine power is usually considerably less costly than electric power, but the convenience of electric power cannot be overlooked.

It is apparent that the keynote of all maintenance for the air compressor equipment is cleanliness. We have compressors that have been in daily operation in foundries for many years with no repairs. We have others that have required new rings and other replacements in a few months. It is entirely up to the foundryman to make the decision whether he wants trouble-free operation, or costly repairs and interrupted schedules.

Educators Attend Dietert Sand School

EDUCATORS from six universities attended the sand school at Harry W. Dietert Co., Detroit, Sept. 7 to 9. The school was conducted by Frank Brewster, sales manager of the company. Purpose of the sessions and discussion was to provide these universities with a review of present techniques and recent advances in the use and experimentation in progress on the development of sand for specific purposes.

Those who attended the school are shown above, left to right: Richard W. Heine, assistant professor of mining and metallurgy, University of Wisconsin; George K. Dreher, executive director, Foundry Educational Foundation; C. T. Marek, assistant professor of manufacturing processes, department of general engineering, Purdue University; Charles F. Walton, instructor in metallurgy, Case Institute of Technology; Mr. Brewster; Malcolm S. Burton, assistant professor of metallurgy, Cornell University; Donald L. Crews, assistant professor of metallurgy, University of Cincinnati, and Donald A. Bergh, instructor of metallurgy, Michigan State College.

A NEW PRODUCT

Axial flow *Thru* Epicycloidal Rotors ~ *Compact ... Simple ... Positive ... Economical*

YEARS of research, refinement and service have preceded the introduction of our latest product—the STANDARDAIRE BLOWER. It features the axial flow principle in a positive displacement unit of sturdy, compact design. This all-purpose blower gives the greatest air or gas output per pound of weight that has ever been achieved in a positive displacement type blower. The blower is highly responsive to load demands—it's overall efficiency is also high, and for a given output the power consumption is low. Another factor of importance—the Standardaire Blower will deliver absolutely clean air because of its unique oil sealing arrangement. Consult with our engineers for specific details. ***Write The Standard Stoker Company, Inc., Dept. A-15 370 Lexington Avenue, New York 17, New York.***

Important Features of
Standardaire Blower

1. Handles gas or air under pressure or vacuum.
2. Capacities 20 to 15,000 cfm with discharge pressures to 20 pounds.
3. Compression is gradual giving a smooth discharge.
4. Unusually low decibel rating.
5. Permits direct drive by standard motors.
6. Tested in accordance with A. S. M. E. Standards.

For other important features write for Publication No. 84.

THE STANDARD STOKER CO • INC •

A PRODUCT OF **Standard Stoker**

NEW YORK • CHICAGO • ERIE • MONTREAL

By PAT DWYER

Drawings by RICHEY

ADVENTURES OF Bill

EVERY now and again," Bill said, "and that's near enough for any ordinary statement, every now and again, I wonder why I waste the time reading the newspapers. I read about the doings of people I don't know, never did know, and in all probability never will know. I read about the activities of our duly elected representatives and where does that leave me? At the post, that's where it leaves me, little Johnny Holtott, holding the bag. These anointed lads throw away the nation's money with both hands and then calmly announce another hike in the tax rate for the coming year. I am not asked whether I am in favor of the movement, or not in favor of it. I am notified to come across with another handful of the hard-earned shekels. Of course, I am offered a generous alternative. I can spend a few years as a non-paying guest at one of the many high-walled institutions scattered over this broad land, and maintained at the public expense.

"Another group which arouses my ire—there is a word you never hear in ordinary conversation. It is the exclusive property of the newspaper headline writers—well, anyway, members of this group throw handfuls of the STUFF around like so much confetti in a pathetic attempt to show one and all the important perch they occupy on the social ladder. These are the birds who neglect to pay the newspaper delivery boy for weeks, and then try to cheat him by brazenly claiming that he did not leave a paper Monday and Wednesday, week before last. In a highly refined gambling joint they nonchalantly toss away a few GRAND, bribe the head waiter for a table, tip the waiter a ten-dollar bill for serving a dinner that could be had elsewhere for a dollar, and then bestow a five-dollar bill on the hat-check girl for parking a hat for maybe two hours. They don't know or they simply ignore the fact that the five is taken care of by the MAN BEHIND. The girl is paid a salary or a very small percentage of the *take*.

"The third factor in my resolve to stop reading the newspapers is the omniscient, infallible columnist who knows all, sees all, hears all and tells all. He is an ardent admirer of the night clubs and the free spenders. He tries valiantly to create the impression that the highest feather in the cap is a line in the column: 'The fabulously wealthy Omar S. Mildew, nephew of the Ahkoond of Swat, attracted a great deal of attention last night at the Raven's Roost, where he escorted the lovely, charming, dynamic, magnetic and be-minked Indian Princess, Akyrnt, The Prairie Flower.' "

"Seems to me," I said, "I have heard of her before:

There once was a cute little Sioux
Whose figure was something to vioux
When she swished past the tepees
The braves all got creepies
And every last one yelled,
'Wioux, wioux!'

"If I am not too inquisitive, stepping in where angels fear to tread, and all that kind of stuff, did you read something particularly nauseating recently to stir up the bile, shorten your breath, float spots before your eyes, induce shouting dreams, and cause you to linger in front of hock shops where a wide variety of lethal weapons is or are tastefully displayed? Did you mentally balance the effectiveness and merits of rifles, revolvers, daggers, bayonets, yatagans, and wicked looking machetes from sugar cane countries, and gleaming, serrated krises from the Far East? In a word and not to put too fine a point upon it—to quote one of the late Mr. Dickens' characters—what heated you up to the point which decided you to stop reading the newspapers?"

"A very good question, indeed, if you leave out all that tripe about guns, burglar tools, mashaytas and the weapons used by head hunters in the far parts of the earth. I often have wondered where a primitive people, presumably ignorant of all

(*Continued on page* 196)

He is embarrassed to admit he cannot meet the polite request of the man with the gun

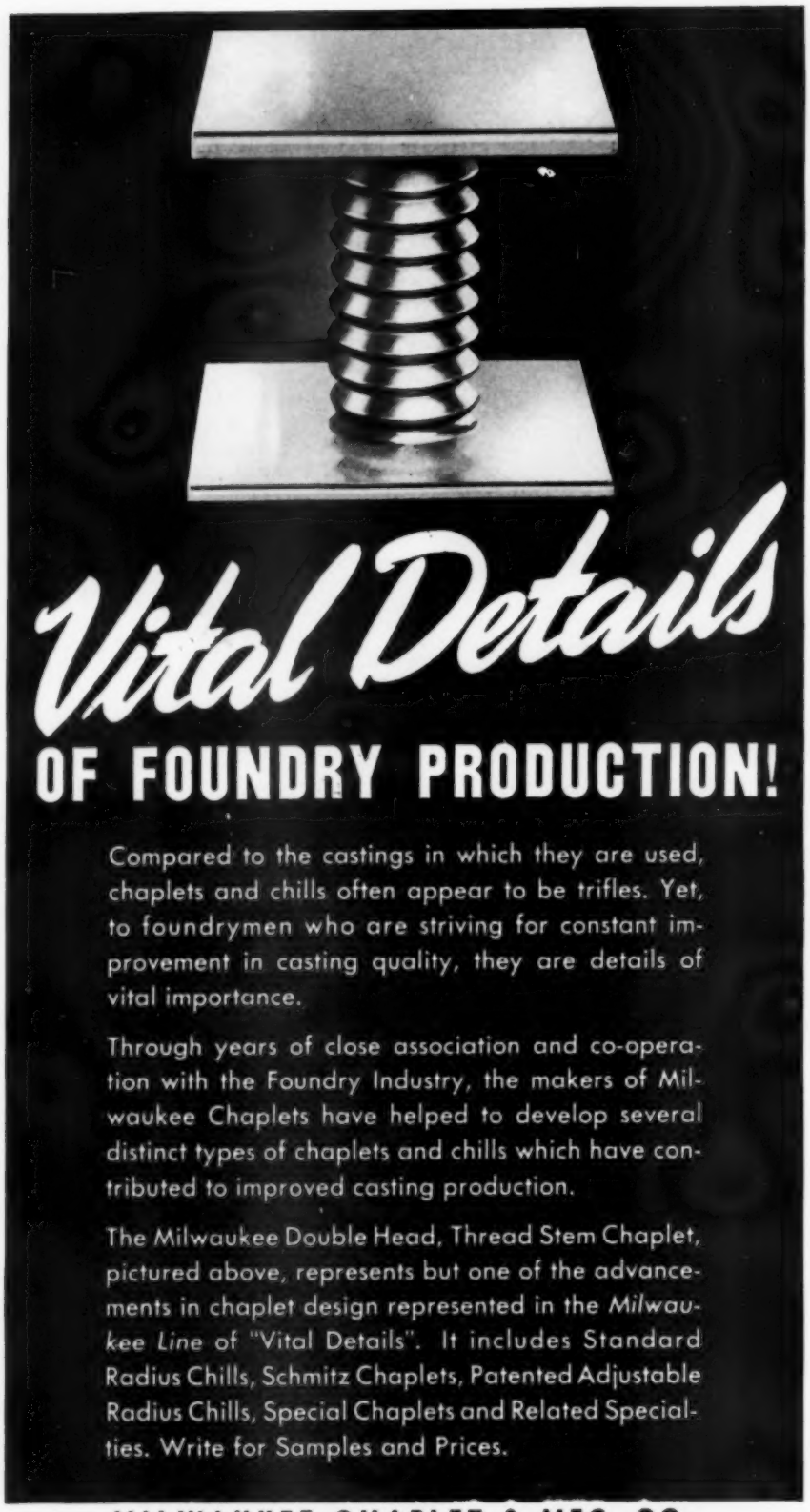
New High-Speed Heavy-Service MONORAIL CRANES

These new American MonoRail Cranes offer all the advantages of easy movement, rugged construction, low-cost operation and quick installation to handle load capacities up to 10 tons. American MonoRail Cranes operate by cab or floor by finger-tip control. Interlocking devices permit carrier to travel beyond craneways—either manual or power-operated. Loads are moved over maximum area, every square foot of operating and storage space is served. Twin-bridges with carrier mounted between bridges bring load clearance to uppermost limit for low head-room operation. Cranes can be installed under present operating conditions without excessive structural changes. American MonoRail Cranes are available for any type of job. An American MonoRail engineer will be glad to discuss the possibilities of crane operation, regardless of the type of handling.

Send for Bulletin MF-1 describing the development of American Mono-Rail Cranes.

THE AMERICAN MONORAIL COMPANY

13104 ATHENS AVENUE CLEVELAND 7, OHIO


Vital Details
OF FOUNDRY PRODUCTION!
Compared to the castings in which they are used, chaplets and chills often appear to be trifles. Yet, to foundrymen who are striving for constant improvement in casting quality, they are details of vital importance.
Through years of close association and co-operation with the Foundry Industry, the makers of Milwaukee Chaplets have helped to develop several distinct types of chaplets and chills which have contributed to improved casting production.
The Milwaukee Double Head, Thread Stem Chaplet, pictured above, represents but one of the advancements in chaplet design represented in the Milwaukee Line of "Vital Details". It includes Standard Radius Chills, Schmitz Chaplets, Patented Adjustable Radius Chills, Special Chaplets and Related Specialties. Write for Samples and Prices.
MILWAUKEE CHAPLET & MFG. CO.
1025 SOUTH 40TH STREET • MILWAUKEE 4, WISCONSIN
MILWAUKEE CHAPLET

(*Continued from page* 194)

manufacturing methods, managed to outfit themselves with such elegant and effective weapons. Do you think some of these tools had their origin—well, let us say—north of the equator?"

"Could be," I answered carelessly, "but if you will pardon my density, I fail to see what bearing your rigmarole has on the question before the house."

"Patience, my dear young fella, patience. 'Tis a wonderful virtue, worthy of earnest study and constant practice. Take an example from your uncle William, or if you prefer, the present speaker. Of course, I am highly flattered by the intense interest you display in the present discussion, but as the mentor of my apprentice days, far away and long ago, frequently cautioned me when I showed a tendency to put up the big jib: 'Don't rush the hearse. The mourners are all on foot.' "

"He must have been an exceptionally good teacher, or what is more likely, you must have been an extraordinarily apt and diligent pupil."

"Well," said Bill, "I'll tell you. The arrangement was what you might call a 50-50 split. The old boy was quite a character. No person knew his age or how long he had been working in the foundry. Whenever the question came up he gave a different answer, all answers probably wrong. He had quite a hump on his back like that of a camel. He had calloused pads on his knees from working on jobs in the floor. Sharing another attribute of the camel tribe, he could absorb vast quantities of the stuff that bites like an adder and stings like a serpent. Maybe it is the serpent which bites and the adder does the stinging. Who cares? On each occasion he took on enough to carry him over the arid period between pay days. While down that way several years ago, I had the melancholy pleasure of tramping behind the hearse and of holding one of the cords by which the casket was lowered into its last resting place. 'Twas very light."

"O, all right," I said. "All right. Now that you have told me the history of your life, perhaps you will be good enough to answer my question."

"Ah, yes. I believe there is still a small item on the agenda. You want to know what I am griping about. Listen to this extract from a newspaper columnist:

Leslie Q. Sereno, the entertainer, told friends here that he was very

much embarrassed at the Hilltop Club holdup about 2 years ago. He was entertaining at the mike when the bold gang leveled submachine guns at the crowd. He was embarrassed because he had no money to give to the boys. His pockets were empty. So—last month when he played again at the same club, he inserted a clause in his contract that assured him $1000 cash in his jeans each night, just in case!

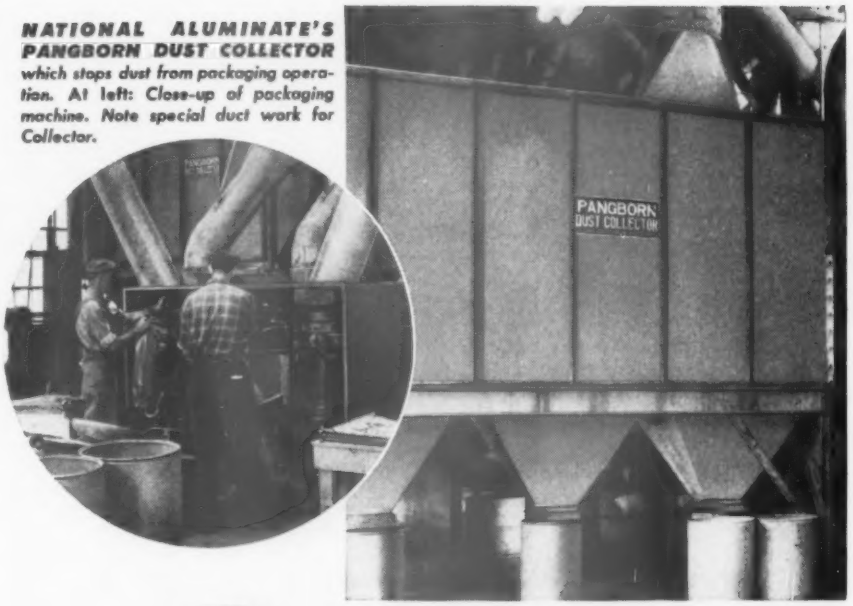
"Instead of getting down on his hands and knees and offering up thanks for escaping a loss, he was *embarrassed,* if you please, because he had no money to hand over to a bunch of robbers. Then he stuffs $1000 in his pocket every night, in case the boys call again! I don't know which one of the pair should

Yearly upkeep is fairly high

be hung up on a hook to dry, the assinine entertainer or the admiring columnist. By way of a breath of fresh air let us consider a recent inquiry. I have the letter here some place. Ah, here it is.

We are having trouble with a red brass casting shaped somewhat like a bell, except that it is open top and bottom. The casting is 12 in. dia at the top and 18 in. at the bottom. Thickness of metal ¾-in. at the top and 1-in. where it flares out near the bottom. Top and bottom refer to the position in which the casting is molded and poured. The mold is made in a three-part flask, drag, cheek and cope. The face of the mold is blackwashed and then skin dried with a torch. Two sprues in diametrically opposite corners of the cheek deliver metal to runners and several small, flat gates at the bottom edge of the mold. Metal poured from two crucibles fills the mold and the lower part of two wedge-shaped risers. Remainder of the risers is filled with hot metal from a third crucible. The casting apparently is clean and solid when shaken out and cleaned, but when the inside is machined, a ring

NATIONAL ALUMINATE'S PANGBORN DUST COLLECTOR *which stops dust from packaging operation. At left: Close-up of packaging machine. Note special duct work for Collector.*



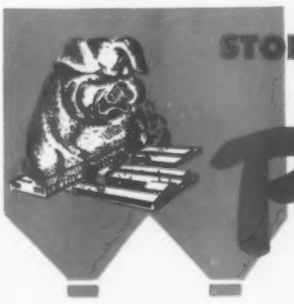
Pangborn DUST CONTROL *saves National Aluminate $14,859 a year*

$14,859 . . . that's how much Pangborn Dust Control saves The National Aluminate Corp. of Chicago, Ill. *each year!* Chemicals, used to make NALCO products (which prevent scale formation in boilers, etc.) are recovered by five Pangborn Collectors to the tune of 3900 lbs. a day! At current prices for raw material that spells $58.50 a day, or a $14,859 profit each year. As L. A. Scheidler, plant superintendent, says: *"We couldn't operate without Pangborn Dust Control . . . the collectors have paid for themselves!"*

HOW ABOUT YOUR PLANT?

Unknown to you, dust may be costing you money. Find out . . . let us make a "dust pocket" survey of your plant at no obligation! Pangborn engineers show you how Pangborn Dust Control can save you money. For full information write for Bulletin 909A to: PANGBORN CORPORATION, 300 Pangborn Blvd., Hagerstown, Md.

Look to Pangborn for the latest developments in Dust Control and Blast Cleaning Equipment.



STOP THE DUST HOG from stealing profits with

Pangborn

DUST CONTROL

P.A.
BOSS
FOREMAN
We all agree on
"CERTIFIED"
"I like 'Certified' Abrasives. They're extra tough, keep our blast-cleaning operations at top-efficiency. Clean better, produce a better product, and that means more sales."
" 'Certified' abrasives suit me to a 'T'. I always specify 'Certified' because they keep blast cleaning costs at rock bottom. Actually cost less because they can be used over and over and over."
"Blast cleaning's easier with 'Certified.' Since using Samson Shot and Angular Grit my crew turns out more work every day—and it's better work, too. Keeps costs down and makes my bosses happy!"
. . . Always Specify "CERTIFIED"
100 LBS.
ANGULAR
GRIT
MANUFACTURED BY
STEEL CO.
PITTSBURGH, PA. U.S.A.
USE NO HOOKS
BOSTON, MASS.
U.S.A.
USE NO HOOKS
PITTSBURGH
CRUSHED STEEL CO.
PITTSBURGH, PENNA.
STEEL SHOT
AND GRIT CO.
BOSTON, MASS.

of small pin holes or shrink holes is disclosed under the shoulder. We are thinking of adding four risers on top and extending them down as pads on the outside. We shall appreciate your opinion on the cause and remedial measures to be taken for this form of defect.

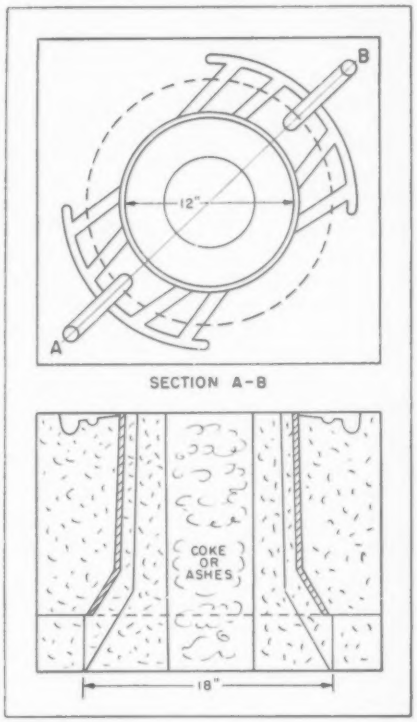
"I pointed out to this frank and honest citizen, the defect may be traced to several causes. 1—The skin drying may not be as thorough as it should be. It may not be uniform. Some areas may not be as dry as others. The metal will not lie quietly against these areas. It will flutter a little and every flutter is reflected more or less in a number of bubbles. 2—The sand may be rammed a little too hard under the sloping shoulder. The metal will kick. 3—The mold may not be vented adequately. Where a large or small body of sand is entirely surrounded by metal, extra passages must be provided for exit of gas and steam. 4—If the walls of the mold yield to some extent after pouring ceases, the metal has a tendency to sink. In a comparatively thin casting the frozen metal above will not flow down to compensate for the sinking. The result is a draw or shrink to a greater or lesser extent in the wall.

"Theoretically, and the theory has been proved by actual application, a mold should be filled with metal in a manner to promote directional solidification. In this particular instance and in others of a similar character, this means that freezing should commence at the bottom and progress gradually upward. Hence the metal should be poured through gates at the top instead of the bottom. To put it another way, the hottest metal should be at the top when pouring ceases.

"The following procedure is suggested. Under favorable conditions and with a fairly open sand the mold might be made in green sand. A fine facing sand might be applied to the face of the pattern and the remainder of the mold could be filled with a coarser and more open variety. However, since you probably are limited to the use of fine sand all the way through, it may be used, but it must be vented to a greater extent than usual.

"The flask must be strong and rigid to prevent the outside wall of the mold from yielding. A little extra thickness in the wall might not interfere with the use of the casting, but in a vertical wall it will promote a draw or shrinkage. The skin drying is a useful precautionary feature, but it must be uniform and trusted only to a careful and skilled operator.

A 6-in. plug rammed up in the center and extracted before the pattern is removed will furnish the main vent for the core. The opening may be filled with fine coke, ashes or dry sand to prevent the wall from collapsing when the mold is filled with metal. Auxiliary venting with a wire will include a ring of slanting vents when the core is partly rammed, and a row of straight vents inside and about an inch from the face of the pattern. A small channel is scratched from the top of each vent to the large opening in the center. A 1-in. opening in the center of the cope will serve as an exit for steam and gas from the core.



"Under certain conditions—for example, when the metal is poured from a single ladle—a runner basin, a sprue in the center of the cope, a circular runner and a number of small gates on top of the core might be advisable. In the present instance that arrangement would interfere with the vent openings. Therefore two sprues in diametrically opposite corners, as at present, will serve. The sprues deliver metal to runners and a number of small gates entering the top edge of the casting.

"With this arrangement and with the metal poured fairly slowly the casting should climb up gradually, commence freezing from the bottom upward and should not require either risers or pads on the outside. One or two small risers may be employed to show when the mold is filled."

HAUSFELD FURNACES

FOR GAS OR FUEL OIL

ARE MEETING EVERY EXACTING REQUIREMENT

FURNACES FOR
BRASS • ALUMINUM • MAGNESIUM
AND ALL OTHER
NON-FERROUS ALLOYS

HAVE YOU INVESTIGATED THEM FOR YOUR MELTING PROBLEMS?

The Campbell-Hausfeld Co.
300-320 MOORE ST. HARRISON, OHIO

Cupola Operations

(*Continued from page* 79)

stages of the investigation it was noted that most of the burn-out occured in the area above the two back slag holes and it was assumed that the blast in that area was less than in other areas, thus allowing the low-velocity air to go up the face of the cupola above the slag holes and tuyeres. A check with an anemometer seemed to verify the assumption. However, further proof was needed, and several checks were made over a long period, with changes in each of the variables which might influence the blast distribution. It was found that several items contributed to the nonuniformity of blast, and when these were corrected results were satisfactory.

Items corrected were the improper blocking off of sections of the two tuyeres nearest the slag holes, the use of two slag holes, and the general conditions of the wind box. It was finally found that by carefully blocking off small areas of the two tuyeres nearest the slag hole, with only one central slag hole (made with a special long-life slag hole brick), and with a slight change in the wind box arrangement, the blast distribution became uniform and the burn-outs were relatively small and even.

Of course, this was only true when fundamental cupola practices were followed. Many times such variations from standard practice as excess limestone, uneven distribution of metal in the charge and extra wet patching material were encountered, and as a result it was impossible to name any particular item as the cause of the difficulty. A partial list of fundamental cupola practices which had to be carefully followed before any of the special changes made during the tests could be applied with beneficial results, includes the following. With variations and additions these fundamental practices would be applicable to any cupola operation.

1. Any slag holes should be symmetrically placed between the tuyeres.

2. Diameters should be checked carefully at various points each time a lining or patch is applied.

3. Patching muds should be made according to a definite standard which would include such items as moisture and weights of ingredients. The tendency is often toward poor dry mulling and excessive moisture.

4. Both excess mud and excess moisture in the mud should be avoided. Too often the tendency is toward a wet product easy to apply but difficult to dry properly. Often very little time is allowed for drying linings and patches, and excess moisture is at least partially responsible for bad burn-outs. Some muds were found to be satisfactory at 10 per cent moisture while others worked well at 20 per cent. Size of cupola and heat has much influence on the amount of mud to be used.

5. Minimum times should be designated for drying out both a lining and a patch. Such minimums will vary for each mixture and each amount of mud. Cases have been noted where a new lining was made and the cupola used before sufficient drying had taken place. As a result, excessive burn-out would occur on the first heat and the tuyeres and lining would be in poor condition. In fact, many first heats on new linings were more harmful than as many as the next 15 heats combined.

6. A close check should be made of measurements and dimensions such as distances from bottom plate to tap hole, tap hole to tuyeres, tuyeres to charging door, and slope of the sand bottom. All this information should be included in the standards.

7. Tuyeres and wind box should be kept clean, free of metal, slag and coke.

8. Weights and sizes of metal, coke and limestone in the charges must be watched closely.

9. It was found essential that charge distribution be kept even and uniform. This is especially true when large cupolas are hand charged because there is a tendency to deposit heavy pieces just inside the charging door, thus creating a void opposite the door. This void might then be filled with coke to have a relatively level surface for the next metal charge. In this way charges would not be uniform in thickness over the entire cross section.

10. Poking of the coke bed through the tuyeres should be carefully watched and standardized.

11. A thorough survey of all cupola principles was found essential. Items such as all dimensions and measurements, blast pressures, blast control instrument settings, anemometer readings, coke weight and height for the bed, detailed information on all charge materials, wind box and tuyere conditions, and all patching and lining information could be included in the survey.

12. It was found that extra wet patches would have a tendency to crack even when sufficient drying time was allowed. As a remedy, these cracks were slurried over rather than left as possible points of weak-

(*Continued on page* 203)

RELIGIOUS SERVICES are held once a month at Barnett Foundry & Machine Co., Irvington, N. J., under the direction of Tony Monteiro, who started the practice at the request of the workers several years ago when he was an employee of the foundry. The nondenominational services are conducted for a half-hour, 15 minutes of which is donated by the company, the balance being voluntarily given by the men from their lunch hour. Since the program's start, ten other factories in the area have enlisted the services of Mr. Monterio, who now is a Presbyterian minister

DUSTUBE provides "Ideal Working Conditions"

for the LENNOX FURNACE CO.

GRINNELL FOUNDRY DIV.

Grinnell, Iowa

MR. GEORGE NICHOLS
Foundry Superintendent

"When this foundry was started several years ago it was designed to provide ideal working conditions—including a Dust-free cleaning room. A Dustube Dust Collector was installed to ventilate all grinding and blast cleaning operations. Due to the high collecting efficiency of the Dustube our goal has been reached at an exceptionally low operating and maintenance cost. For the few cents a day it costs to operate the Dustube, we gain dollars."

FOUNDRY SUPERINTENDENT

MR. FRED RAYL
Master Mechanic

"I'm 100% for the Dustube. For the amount of dust it handles daily the relatively little attention it requires is unbelievable. Periodic inspections are simple—all working parts are easily accessible—in a few minutes the job is finished. Once a week the collector is emptied, with the automatic and efficient shaking of the tubes thoroughly removing all dust without any cloth wear."

MASTER MECHANIC

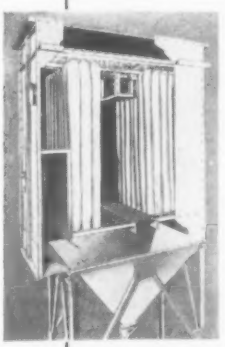
MR. JOE LEE
General Foundry Foreman

"It would be easy to forget we had a Dustube Dust Collector—we take its benefits and advantages for granted in the cleaning room. However, we can't overlook the complete absence of dust arising from the cleaning machines and the Dustube must get all credit for this. We never have any complaints of dusty conditions from any of our men."

GENERAL FOUNDRY SUPERINTENDENT

There are no complaints from the crew when you have a Dustube to keep your plant free from dust. The high efficiency of the Dustube makes your plant a happier, healthier place to work . . . it increases productivity. Maintenance men find Dustube requires very little attention.

All through the plant everyone agrees: "It pays to own a Dustube."



DUSTUBE ADVANTAGES

BETTER DUST REMOVAL—Simple, fast, thorough. Shortens cleaning time.

POWER SAVINGS—Lower resistance to air flow. Lower air velocities.

HIGH EFFICIENCY—Nearly 100% efficient by convincing tests.

EASE OF INSPECTION—Clean, safe, simple. No parts to remove.

DUSTUBE FILTERS—No abrading metal contact. Easy to ship, store and handle.

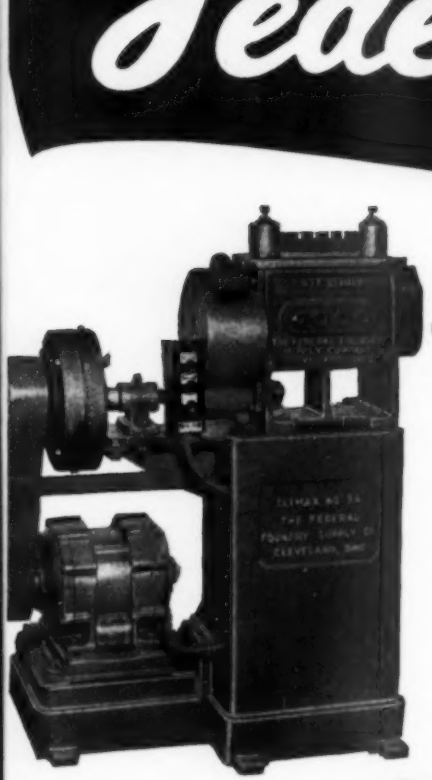
FILTER REPLACEMENT—Takes only a few seconds. Requires no tools.

Write today for complete information about the many advantages of Dustube collectors. Ask for Catalog 72-A.

American dustube
DUST COLLECTORS
OFFICES IN PRINCIPAL CITIES

AMERICAN WHEELABRATOR & EQUIPMENT CORP. 505 S. Byrkit St., Mishawaka 2, Indiana

Federal FOUNDRY EQUIPMENT

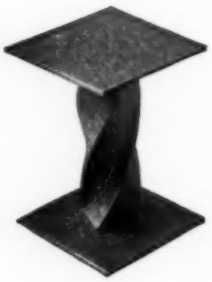


CLIMAX WIRE STRAIGHTENERS

Any foundry, large or small, can cut production costs by straightening and reusing core wires and rods. With a Climax Wire Straightener this can be done quickly, economically, safely—by unskilled labor. A complete descriptive circular is yours for the asking.

FOLLOW THE FEDERAL LINE

The products on this page represent three of the many items which Federal supplies to the foundry trade. Altogether we have more than 400 different foundry products. Rely on The Federal Foundry Supply Company for your needs.



TWISTED STEM CHAPLETS

The chaplet with everything. The "Twisted Stem" promotes rapid complete fusion. Not deformed, the stem has no weak spot to burn in and permit core shift. Made in a complete range of sizes. Samples of the size you use, gladly submitted.

"THE TWIST DOES THE TRICK"

FEDERAL'S LOWE SIFTER

Save money by faster sifting, better sand conditioning with a Lowe Electric Sifter. Features: greater screening area, enclosed ball bearing motor, more shoveling room. Write for information. Prompt delivery.

THE FEDERAL FOUNDRY SUPPLY COMPANY

4600 East 71st Street • Cleveland 5, Ohio

CROWN HILL, W. VA. · CHICAGO · MILWAUKEE · RICHMOND, VA. · ST. LOUIS

CHATTANOOGA, TENN. · MINNEAPOLIS · NEW YORK · DETROIT · UPTON, WYO.

(*Continued from page* 200)

ness where burn-outs could start. Of course, it was found best to keep moisture content of the patching material low so as to minimize the possibility of cracking and spalling.

13. A study of slag and slag conditions was found valuable. The use of sand, in conjunction with variations in limestone, was found to be one possible way of controlling slag as desired. It was found that a dark green slag was desirable and sand was often found of value in maintaining this color. With this periodic use of sand to counteract excess limestone it was also possible to control the burn-out to some extent.

14. The most careful control of blast distribution uniformity before each heat was of little avail until the problem of slag hole erosion was solved. In this investigation back slag holes were used and during large heats they would erode badly. In the resulting enlarged condition they would cause uneven blast distribution within the cupola which, in turn, would cause excessive burn-out in certain lining areas. After several types of slag hole blocks were tested, one kind was found which stood up well under the most severe operating conditions. As a result of this slag hole block experimental work, the problem of lining burn-out was minimized.

15. Even with the new type slag hole blocks it was found of utmost importance that they be carefully located in reference to the tuyeres and the face of the lining. When the most desirable location was determined, the information was included in the standards.

Measurements and dimensions found to have some influence on the operation of all cupolas checked are as follows:

1. Bottom of cupola to bottom of tuyeres.
2. Bottom of slag hole to bottom of tuyeres.
3. Bottom of slag hole to bottom of cupola.
4. Tap hole to bottom of cupola.
5. Tap hole to bottom of tuyeres.
6. Size of tuyeres at lining.
7. Distance from tuyeres to charging door sill.
8. Size of tuyeres at shell.
9. Number of tuyeres (for calculating tuyere areas).
10. Thickness of sand bottom at tap hole.
11. Thickness of sand bottom at slag hole (if other than tap hole).
12. Diameter of shell.
13. Diameter of lining at various points.
14. Wind box volume.
15. Blast main volume.

As a conclusion for this particular investigation, it was felt that a list of suggestions might convey the most information. These recommendations are given simply as a reminder and for emphasis, since they should be standard practice in all foundries.

1. Place tap holes and slag holes symmetrically.
2. Do whatever is necessary to keep the blast distribution uniform. Anemometer readings are helpful.
3. Keep the moisture of the daub or mud at a minimum so that excessive cracking and spalling of the patch is prevented.
4. Dry mull the patching materials at least a short time before water is added in order to get thorough mixing and blending.
5. Investigate various lining and patching materials to find the best for the particular conditions involved.
6. Set (and follow) standards for drying linings and patches.
7. Slurry over any cracks in the patch before the cupola is used rather than leave them as points of weakness.
8. Keep the wind box and tuyeres clean.
9. Place special emphasis on bed coke, bed height, and proper burning in of bed before charging.
10. Follow cupola measurement and dimension standards religiously. Those most often violated are the diameters at various points after patching or relining, the slope of the sand bottom, and the location of slag and tap holes.
11. Investigate various types of tap hole and slag hole blocks to obtain the best for the desired application.
12. Review all cupola principles regularly and revise as necessary. Principles to be reviewed would include measurements and dimensions, blast information, lining and patching data, and bed and charge details.
13. Take advantage of the valuable information which can be obtained from slag and slag conditions.
14. Carefully watch and control the height of the charge level and the distribution of charge materials.

As a result of this investigation, which started because of an excessive burn-out condition, cupola operations have been given their proper place of importance in the foundry involved.

Since successful cupola operations stemmed from the application of thorough cupola standards in this particular case, it became increasingly

MOLDING MACHINE: Societe de Fonderie D'Aluminium & D'Alliages Legers, a new foundry at Arandon, France, recently purchased the molding machine pictured above from Davenport Machine & Foundry Co., Davenport, Iowa. The machine weighs 85,000 lb and is 18 ft long and 8 ft wide with a capacity of 12,000 lb. It will handle a flask 72 x 140 x 45 in. Said to be one of the largest machines of its type in the world, it will be used to produce molds for aluminum castings to be used in the Francais-Gregoire automobile

apparent that satisfactory results could be obtained in the same way in other cases. However, regardless of the simplicity and economics of the successful application of such standards, many foundries are guilty of faulty practice. Some of the most common faults are:

1. Some pieces of charge metal are too large.
2. Blast volumes and pressures vary too often and too widely.
3. Poor selection and sizing of bed coke results in irregular weight-height ratios for coke bed.
4. Poor burning in of coke bed.
5. Proper settling of the bed by means of poking at the tuyeres is neglected.
6. Charging is started and the blast turned on before the bed has been burned-in properly.
7. Sand bottoms improperly made and sloped.
8. Cupola diameters vary too widely when checked at different locations. Unintentional steps, ledges and over-hangs give irregular diameters which cause wide variations in weights and heights of bed coke as well as hang-ups and bridging.
9. Irregular and nonuniform size of tuyeres.
10. Nonsymmetrical spacing of tuyeres.
11. Charge levels in the cupola too low.
12. Proper measuring of bed height neglected.
13. The poor practice of using a "left-over" bed after it had been partially burned-in (but not used) the previous day.
14. Tuyeres and wind boxes not kept clean.
15. No method for measuring blast distribution.
16. No strict specifications or standards to be followed by suppliers of raw materials.
17. Weights, moistures, and mulling cycles of daubs or muds not standardized.
18. Lack of safety in such operations as chipping, charging, and relining.
19. Lack of basic literature on raw materials.
20. Lack of proper segregation of yard materials.
21. Excessively wet muds, daubs and "soups".
22. Standard cupola measurements and dimensions ignored or neglected.
23. Use of too many expensive cupola blocks for relatively simple patching jobs where firestone or amorphous silica would work.
24. Addition of several hundred pounds of green coke to the bed just before charging and melting.
25. Use of coke boosters.
26. Importance of slag color and slag conditions is not common knowledge or is ignored and neglected.
27. Lack of proper significance given to the limestone problem.
28. The problem of tap holes and slag holes is neglected.
29. Shutting off the blast several times during a heat.
30 Inaccurate weighing of charge materials.
31. Blast often turned on before the cupola is completely charged. It is not only poor practice, but it is also difficult to fill a cupola after the blast is on.

FOR EVERY FOUNDRY PURPOSE

FIRE CLAYS

• The most widely used of all fire clays in midwest foundries. They supply every bond and refractory requirement. These clays are prepared in a large, modern grinding plant, which for 32 years has served the foundry industry with prompt and dependable shipments.

Valuable consultation is available with experienced engineers for the best use of fire clays in foundry bond and refractory service. They often supply important help for the reduction of foundry scrap losses.

A new booklet with many pictures about the production of Goose Lake Fire Clays is available upon request. Write now for your copy.

Make "your" next car of fire clay GOOSE LAKE

Illinois Clay Products Company

FIRE CLAY · CLAY BOND · BRICK · BLOCK

JOLIET, ILLINOIS

Book Review

Machine Tool Selling, by Harry J. Lobert, Cloth, 194 pages, published by McGraw-Hill Book Co., New York 18. Price, $3.50.

This summarizes a sales refresher course sponsored by the National Machine Tool Builders' Association and the American Machine Tool Distributors' Association at Cornell during two weeks of July, 1948.

Investment Casting

(*Continued from page* 83)

the process as it is put into production. The close dimensional tolerances actually leave no margin for error. Because of the variety of factors involved, only general rules may be developed. Actually, each type of pattern to be produced is a rule unto itself. A careful compilation of data and experience will allow a certain number of predictions to be made on the job at hand, but for the complete accuracy needed, only a careful study by the best "pilot shop" methods will insure a successful and economical production schedule. This means the necessity of a well equipped laboratory and sufficient financial stability to absorb experimental costs. Furthermore, there are more than twenty patents on the process and various phases of it, as well as on some of the equipment used. Anyone planning to enter this field should first make a thorough search of the patents. Royalty payments are required by some of the patents, and licensing agreements may be necessary.

Casting Procedures — Any investment casting process consists of six steps: 1. Selection of pattern material, and forming the pattern. 2. Gating practice or "setup" of patterns. 3. Selection of investment, and investing the patterns. 4. Drying, elimination of patterns, and burnout. 5. Melting and pouring of metal, and metallurgical aspects. 6. Knocking out and finishing castings.

Pattern Materials — A variety of materials can be used so long as the patterns are expendable. Wax, plastic, frozen mercury, low melting point metals, and sulphur have all been tried. Wax, plastic and mercury are the ones commonly used in production. The properties of each are very different and each must be handled in different manner. In general, the pattern material used for ferrous alloys can also be used for nonferrous alloys.

Wax Patterns—Use of wax as pattern material is quite old and has been written about many times. Use of wax in the past was so prevalent that investment casting was called the "lost-wax" process. Therefore, only a summary of this subject will be included so that a comparison can be made with the other pattern materials.

A wide variety of waxes are used including beeswax, carnauba and several crystalline type petroleum waxes. Some are proprietary and are sold in compounded form ready to melt. Others prefer to melt and mix their own waxes. To show how carefully ingredients must be blended the following example is cited. The mixture contains carnauba wax (vegetable base, hard, and has high melting point), albacar wax (synthetic wax, hard, and has high melting point), burgundy pitch and turpentine (both tend to lower the melting point and to impart some elasticity to the mix which would otherwise be very brittle). Not only must these be added in strict observance of a formula, but they must also be added in proper order since both of these factors influences the performance of the wax.

A number of proprietary waxes are available in compounded form which give good results. It is probably better to select one of these than to try blending one's own. One thing, however, must be observed closely. All waxes have different shrinkages and once a wax is decided and pattern mold made, it may be impractical to change wax type without either retooling the molds or building new

"These Plates sure Speed Production"

TRANSITE CORE PLATES are lighter, stronger, resist warpage

Core makers can handle more Transite* Core Plates at one time, thus make fewer trips. That means faster production with less fatigue and fewer accidents. Transite Core Plates offer all these advantages:

They Last Longer—Made of fibrous asbestos and cement, Transite Core Plates resist shock . . . are less likely to crack or break.

They Clean Easily—Core wash, sand, etc., do not stick as readily as to other materials. Both sides are usable.

They resist Corrosion and Warpage—Transite Core Plate surfaces stay smooth even after long service. Warpage is less than 0.1%.

They are Economical—Low price, low maintenance and long life add up to low cost.

To eliminate green cores and reduce baking time perforated core plates are also available.

For full details, write Johns-Manville, Box 290, New York 16, N. Y.

* Reg. U. S. Pat. Off.

Johns-Manville TRANSITE CORE PLATES MADE OF ASBESTOS

ones. This means that a great deal of experiment and thought should be carried on before finally selecting the wax which will be used in production.

Wax patterns are fragile and must be handled carefully to avoid chipping corners and edges. Even fingernails will cause deep scratches on wax patterns. Often it is necessary to place completed wax patterns individually with great care. Also, if allowed to sit around too long, wax patterns may become brittle and shatter like glass. On the other hand, small nicks, holes, or similar defects can be patched with a hot needle or knife blade or small soldering iron.

Fig. 1 shows comparative expansion curves of typical wax and plastic materials. Wax in solid form has approximately four times the expansion that plastic has at the same temperatures. This means that variations in temperature will cause much more dimensional change in wax patterns than in plastic patterns. This points out the need for air conditioning in sections where wax patterns are made, stored, or assembled for casting, since a noticeable change in room temperature may cause dimensions to be outside of tolerance before the patterns ever reach the mold.

Waxes have low melting points, about 170° F, and when melted flow readily and take accurate reproductions of mold detail. However, they have high volumetric shrinkage in cooling from liquid to solid state and are subject to shrinkage areas unless properly and uniformly handled. This means controlling mold temperature, wax temperature (usually ±5° F), and injection pressure (whether hand or automatic). Pattern molds must be well lubricated to facilitate removal of wax patterns.

Wax which flows out of the mold can be reclaimed and reused for certain purposes such as for sprues, gates, etc., by simply remelting it. It is not generally used for patterns, however, since particles of ceramic or other foreign matter may cause bumps in the pattern, or if they fall out will leave pits.

Due to its low melting point, wax can be easily injected into pattern molds. In many cases of short runs the injection may be done by hand using a bulb syringe to furnish the pressure. However, it is difficult to hold close dimensional tolerances not only from casting to casting but from pattern to pattern, owing to shrinkage characteristics of the wax and the nonuniformity of hand-injection pressure.

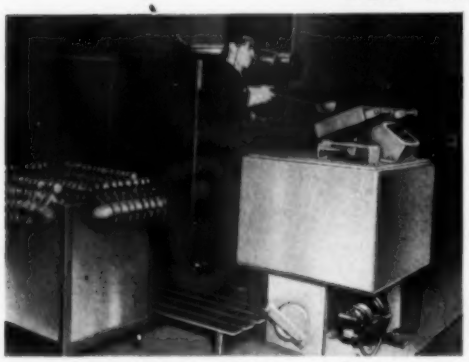
It is much better to use injection machines where pressure can be maintained constant. Simple machines of this sort can be bought for as low as about $200. Wax injection requires less pressure than plastic injection, usually about 400 psi, therefore the wax injection machines are much simpler and cheaper. Small wax extrusion machines can be purchased for making sprue stock of a wide variety of sizes and shapes.

Wax patterns can be set up or assembled by using hot needles or knives, or small soldering irons. Flat or round lengths of wax can be melted as filler material if needed. Wax can also be used on short as well as long-run jobs since soft metal pattern molds can be made cheaply. Molds or dies for wax patterns can be made cheaper than those for plastic injection. The cost of waxes is usually about three times that of plastic.

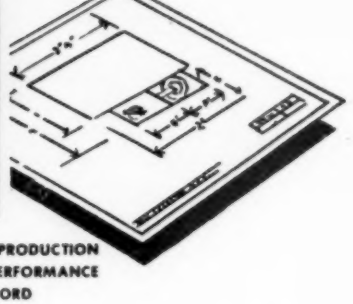
Plastic Patterns—Recently, plastic patterns have replaced waxes for many applications. Some of the advantages and disadvantages of plastics are discussed below. The usual plastic used for this purpose is polystyrene.

Cost is about one-third that of waxes. Polystyrene is plentiful and

TOP PERFORMANCE
WITH AJAX TAMA-WYATT
INDUCTION FURNACES
for Aluminum Alloys



Ajax Induction Holding Furnace at Mid Western Die Casting Co., Chicago, Illinois.



BETTER PRODUCTION THROUGH TOP PERFORMANCE IS THE AJAX RECORD

Ajax-Tama-Wyatt induction furnaces are used in the United States and abroad for melting and holding aluminum alloys in die casting, permanent mold, and sand foundries.

No flux or mechanical stirring is necessary. The metal is in constant gentle circulation assuring complete blending of alloys, and a uniform temperature throughout the metal.

Electric energy costs less than fuel and avoids danger of overheating. Completely automatic temperature controls hold metal to within 5°F., at the lowest possible temperature for perfect casting. With an Ajax the yield for perfect castings is exceptionally high.

There are no fumes and operation is practically noiseless. Shops are cooler, more comfortable—manpower efficiency is increased. Shop space is increased, for an Ajax Holding Furnace takes an average of 30 to 40 per cent less floor space than any other furnace.

The Ajax companies have been pioneers in induction melting of metals since the first World War. To date they have installed more than 400,000 KW. of furnace capacity in the United States alone. This is the background of experience behind every Ajax installation.

AJAX ENGINEERING CORPORATION
TRENTON 7, N. J
AJAX TAMA-WYATT INDUCTION MELTING FURNACE

Associate Companies: AJAX METAL COMPANY, Non Ferrous Ingot Metals and Alloys for Foundry Use. AJAX ELECTROTHERMIC CORP., Ajax Northrup High Frequency Induction Furnaces. AJAX ELECTRIC CO., INC., The Ajax-Hultgren Electric Salt Bath Furnace. AJAX ELECTRIC FURNACE CORP., Ajax Wyatt Induction Furnaces for Melting

since it does not require any blending or mixing, properties are uniform.

The patterns are harder and will withstand more handling and rougher usage than will wax patterns.

The specific gravity of polystyrene is 1.07 and shrinkage .002 —.008 inch per inch in injection.

As shown by Fig. 1, the expansion of polystyrene is considerably less than that of wax, thus making it less sensitive to temperature variations. The softening point of polystyrene is about 200° F, and it burns out at 750° F. It starts to distort under heat at about 150° F, and at about 180° F there is a critical point where the plastic expands very rapidly. At 400° F polystyrene is just soft enough to flow of its own weight, and at 600° F will run rather freely; however, it never becomes a true liquid. It is isotropic (coefficient of expansion is independent of direction of measurement).

Polystyrene patterns can be held to very close tolerances by use of high-pressure injection and do not tend to have some of the defects that waxes have, such as flow lines, misruns, etc.

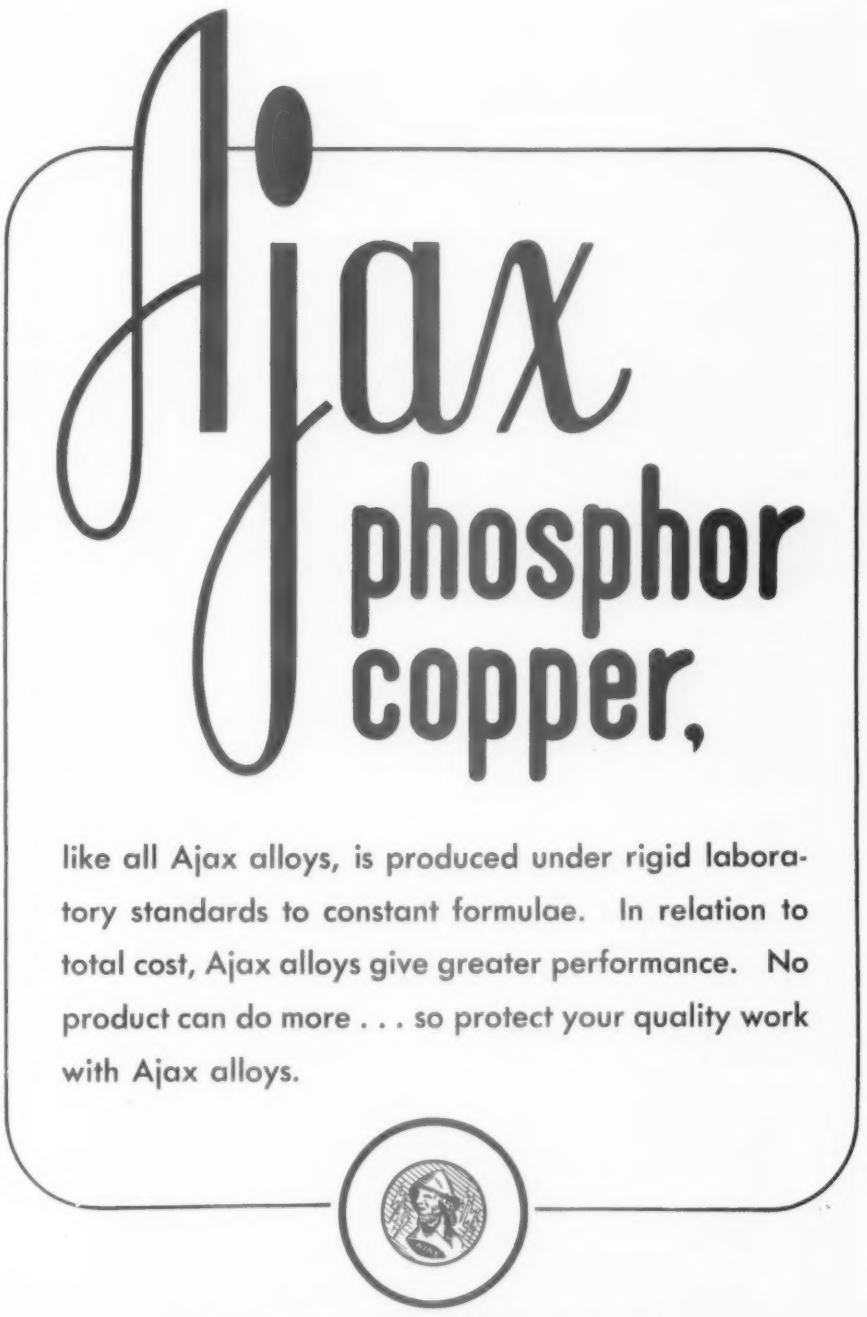
Polystyrene Cannot Be Patched

Polystyrene, if marred, cannot be patched as can wax. Joining of plastic patterns is more difficult than joining wax patterns. Although plastic patterns can be welded together by use of small soldering irons, this does not give a smooth joint. Best results are usually obtained by using plastic cement or solvents. Plastic cement can be made by dissolving some of the polystyrene in a suitable solvent such as benzene. This method of joining is slow since it takes some time for the cement to set enough to hold any weight, and joints tend to be rough.

The best method makes use of a suitable solvent, such as benzene or carbon tetrachloride, using either a felt pad or blotter to absorb the solvent, against which the plastic parts are each touched before placing them together. The solvent may, also, be painted on with a brush. A few seconds are allowed for the solvent to penetrate the plastic, and then the edges are forced together with moderate pressure and held for about 5-10 seconds. To save time small clamping devices could be made for this, thus freeing the worker's hand for assembling. The joined patterns may then be placed upon a prepared surface so that there is no strain on the joint. Approximately one hour should be allowed before taking this pattern to the next step.

Polystyrene is best in long production runs and wax is best for short runs. For that reason many investment foundries use both of these pattern materials. Steel dies are used for plastic patterns made in large quantities. Cost of setting up for injection of plastic patterns is expensive both from cost of machines (which may run up to $20,000), and from the cost of sinking the steel dies necessary to maintain the dimensional accuracy required. The minimum run for polystyrene parts is about 5000 pieces. For shorter runs bronze injection dies have been used, but die life is shorter.

Use of hard steel dies makes it impossible to produce a master mold direct from the part to be produced, as is sometimes done with soft metal master molds. Dies must be designed and sunk using blueprints of the part to be manufactured as a starting point. Since most plastic mold shops are not familiar with the dimensional accuracy required for such molds, it should be pointed out to them when the order is placed that the runners are almost as important as the casting cavities. This is due to the fact that the patterns


Ajax
phosphor
copper,
like all Ajax alloys, is produced under rigid laboratory standards to constant formulae. In relation to total cost, Ajax alloys give greater performance. No product can do more . . . so protect your quality work with Ajax alloys.
AJAX METAL CO., PHILADELPHIA 23, PA.
ASSOCIATE COMPANIES: AJAX ELECTRIC • AJAX ELECTROTHERMIC CORP. • AJAX ELECTRIC FURNACE • AJAX ENGINEERING

must assemble correctly in setup. On simpler parts with liberal tolerances it is often possible to machine a master polystyrene pattern direct from polystyrene bar stock and then investment cast steel die cavities.[3]

In polystyrene patternmaking the pulverized polystyrene is loaded into a hopper from whence it feeds by gravity into the feed cylinder. As the injection stroke starts, a hydraulically actuated plunger forces fresh material into the heating cylinder where it is melted, and the melted material is pushed through an orifice into the tightly locked two-section mold cavity to form the piece. The time cycle can be set to work automatically and pressure is held as long as necessary to cool or harden the material in the mold, the plunger then moving back to allow new raw material to drop into the feed cylinder.

With the pressure relieved, the mold is unlocked and a movable section moves away from a fixed section. The sprue disconnects from the melted material, taking hardened material in the orifice and leaving soft material at the point at which it pulls away. Ejector pins push the molded piece completely free from the mold. To maintain dimensional accuracy in the patterns, die temperature must be held evenly. Some injection machines also have a compression ram that works through the bottom platen. This is of particular advantage in the case of large patterns with one or more heavy sections. The piece can be injection molded and then given additional pressure by this ram to help overcome the inherent shrinkage in heavy sections.

Heating and cooling coils should be in the die to heat thin sections or cool heavy sections to equalize cooling and to help fluidity. If the mold becomes too hot, shrink areas may develop in the patterns and the overall cycle will become too long. If the mold is too cold, it will be difficult to fill cavities. Dimensional control necessitates strict mold temperature control. The chief problem in pattern production is to set up the proper cycle on the machine and then have sufficient controls to maintain the uniformity of the pattern.

Set Up Operation Schedule

It was found that on succeeding production runs it was possible to go into immediate and satisfactory production of the plastic machine by resetting the control on the machine according to the operation sheet set up during the first run. From this experience it is apparent that once the correct operational cycle is set up for a given mold, that mold can be returned to the machine for production at any time. This factor is of great value in the production of patterns for investment casting because it assures reproducible accuracy from one run to the next, and eliminates the trial and error method of resetting the machine each time a mold is replaced.

In polystyrene injection, experience shows that 80 to 100 shots per hour can be produced in production with injection pressures up to 12,000 psi. After a few minutes warmup the rejections by the operator for nonfills and other machine faults seldom ran over 2 per cent.

Patterns are still slightly warm when removed from the mold and consequently must be laid out in such a manner as to prevent warping or distortion. If heavy sections of patterns join light sections, quenching in cold water after removing from machine tends to prevent shrinkage and distortion. The quenching of the patterns must be controlled closely or additional dimensional variations can be introduced. The

"No more gassed castings!"

"Real temperature control has enabled us to eliminate gassed castings," writes an Illinois foundry. "Your Marshall Enclosed-Tip Thermocouples have helped us to eliminate both underheating and overheating of metals. This close check allows us to pour our castings as cold as possible, thus doing away with too much shrinkage."

Marshall Thermocouple measure temperatures of molten brass, bronze, aluminum and magnesium quickly and dependably. Their use aids in producing uniformly sound, dense castings best adapted for machining, increasing output, cutting production costs. Made in two types for use in furnace and ladle. Send for free descriptive folder. L. H. Marshall Co., 270 West Lane Ave., Columbus 2, Ohio.

MARSHALL
THERMOCOUPLES

chief factor to watch is that the patterns themselves are held in the die long enough to be set before putting them in water. If the pattern is not set first, the temperature of the water, the length of time from mold to water, and any other of the human factors will cause variations in the mold to pattern shrinkage ratio. If this happens then part of the efficiency of the plastic pattern is lost.

The patterns should remain in the water bath for approximately five minutes. The cold water sets the outside of the plastic and prevents flow or warpage. After the patterns are cool they may be stacked in pans or other containers. However, if storage is for a considerable period, care must be taken to prevent warpage because the plastic will distort if placed under even small stresses for a long period of time. Another precaution to observe is to handle the patterns in such a manner as not to scratch the surface. Polystyrene can be scratched by fingernails, metal corners, or even from the sharp corner of another pattern. This causes no trouble if reasonable care is taken in handling the patterns.

Polystyrene can be cut if it is not allowed to become hot, otherwise the plastic will gum up, and there is also the chance of warping the pattern. Ordinary finishing equipment may be used if the proper adjustments as to speed, use of coolants, etc., are made.

Good Lighting Necessary

No special equipment is needed for inspection except good lighting and the proper dark colored background because of the transparency of the patterns.

Polystyrene sprues, rejected patterns, flash, etc., can be reclaimed for use. The machines for this purpose are more literally choppers than grinders. Polystyrene cannot be ground because the heat formed will gum up the material in a normal grinder. Adding dry ice during chopping or grinding helps to keep the temperature low. Only 20-30 per cent of used and reground material should be added to new material.

Granular polystyrene is used and should be clear and uncolored since colors tend to leave residues behind in the ceramic mold that are difficult to remove in burnout. The plastic should be dried at low temperature before loading in the molding machine, otherwise the surface moisture will form steam bubbles in the pattern. Some of the bubbles may be near enough to the surface to cause rejection.

Frozen Mercury Patterns — Success has also been obtained by use of frozen mercury patterns for some applications. This has been described effectively as outlined below.

Mercury is poured into dies and frozen. Mercury freezes below minus 40 degrees F. Freezing is progressive and takes place from the bottom up. To accomplish this, the dies are immersed in a cold bath. Lubricant is poured into the die and then liquid mercury is poured into the cavity displacing the lubricant. The frozen patterns are coated with ceramic. The mercury is then removed by spraying warm mercury onto it in a flushing operation. Since the ceramic is applied in layers about ⅛-inch thick, this leaves a ceramic shell of fine surface. Dies for mercury patterns must be of material which will withstand amalgamation, such as aluminum, steel, or certain nonmetallics.

A unique feature of frozen mercury is its cohesiveness. Two pieces of frozen mercury brought in contact are instantaneously bonded and become one. This piece cannot then be taken apart without destroying it. This permits the assembly of

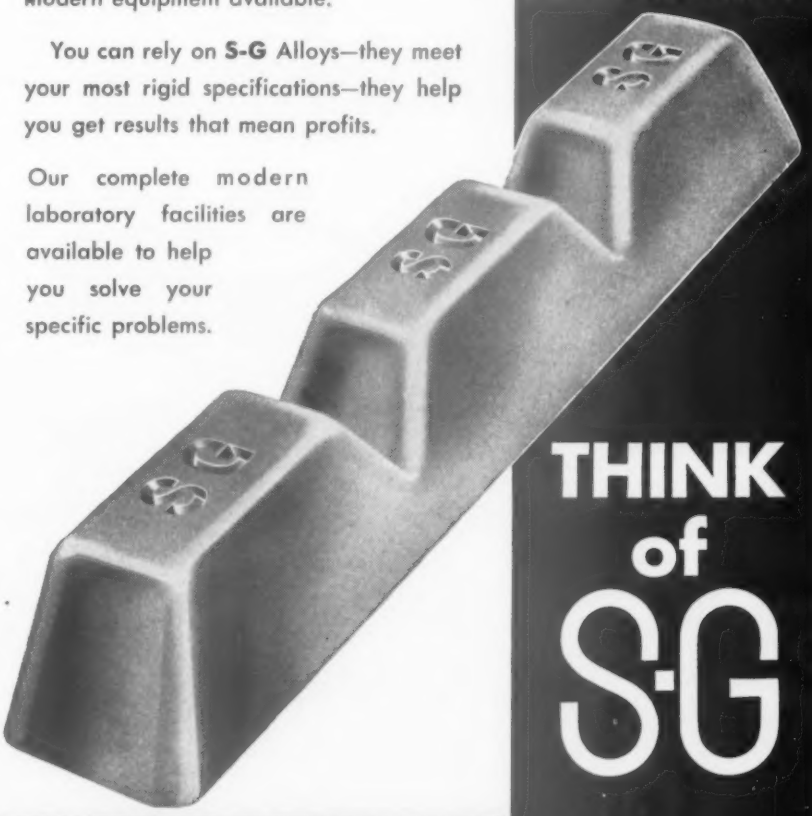
TROUBLE-FREE PRODUCTION of quality castings doesn't just happen. The skill and know-how of diecaster or foundry is of prime importance. But the most skilled of craftsmen must have the right raw material to work with.

Whatever your casting problem may be —die cast—permanent mold or sand cast. Specify **S-G** Aluminum Alloys. Every step in their production is checked constantly by skilled laboratory men using the most modern equipment available.

You can rely on **S-G** Alloys—they meet your most rigid specifications—they help you get results that mean profits.

Our complete modern laboratory facilities are available to help you solve your specific problems.

When You Think of *Aluminum*



THINK of S-G

SONKEN-GALAMBA *Corporation*

MEMBER ALUMINUM RESEARCH INSTITUTE

Riverview at 2nd Street · Kansas City 18, Kansas

many varied forms into one unit which could not be made in any other way.[4]

Other low melting point materials such as Wood's metal and sulphur have been tried, but are not used in production. The author made several tests with sulphur. Test bar patterns were made using liquid sulphur. These were placed in standard ceramic, given normal dryout, then placed in an electric furnace and held at 420° F for 24 hours. Sulphur melted out at about 248° F. During meltout the sulphur showed a penetration of ⅛ to ¼ inch into the ceramic. Immediately after meltout the ceramic formed a dark brown color and did not burn out white by the time it was cast. After 24 hours heating there was still a strong odor of sulphur in the mold. The test bars were cast of aluminum at 1250° F. Examination of the bars showed a rough or mottled surface as though some of the sulphur or SO_2 had remained on the surface of the ceramic. The test bars, however, were within tensile requirements.

In general, wax, plastic, and mercury remain the only pattern materials used in any quantity.

Choice of Investment—There is a natural division between investment casting of nonferrous and ferrous alloys. The investments for nonferrous alloys consist of silica and plaster of paris, the latter acting as a binder. Ferrous alloys react with the plaster, thus necessitating other types of binding material. Furthermore, plaster starts breaking down above 2050° F, and ferrous investments must withstand temperatures up around the 3000° F range. This makes the problem more difficult. It is fairly easy to buy nonferrous investments already mixed, but ferrous investments are usually highly guarded trade secrets, and it is difficult to obtain accurate information about them.

In general, an investment material contains two major constituents; a refractory and a binder. When mixed with water or other suitable vehicle the satisfactory investment will become sufficiently plastic to be formed easily into a mold. It must have sufficient working time to allow for convenient handling, and then set into a hardened mass with reasonable speed. The investment must not contain impurities which would be injurious to the metal being cast, and it must not be fused by the molten metal. It must not crack during burnout or in cooling to room temperature after burnout, and it must withstand heat shock of molten metal being poured into it. It must be hard enough not to erode during pouring, yet should break up easily after the metal has solidified so that the casting can be removed readily. In general, 2000° F is the dividing line between high and low temperature investments.[5]

The low temperature investment (usually used for nonferrous castings) usually contains one of the three forms of silica (which will be discussed later) with gypsum binder. It is mixed with water. A satisfactory mix contains about 70 per cent 200 mesh cristobalite silica, with 30 per cent gypsum. To this mixture is added about 33 per cent water.

Any binder used with wax patterns will be satisfactory for polystyrene, but the reverse does not hold true since polystyrene is less chemically active than wax. Polystyrene is dissolved or attacked by styrene, benzene, toluene, dioxane, ethyl acetate, ethyl benzene, ethyl chloride, carbon tetrachloride, turpentine, gasoline and certain patented solvents. It is unaffected by acetic acid, formic acid, butanol, octyl alcohol, 30 per cent solution of sodium hydroxide, 30 per cent solution of potassium hydroxide, ethylene diamine, salt water, bleaching solution, photographic chemicals, and most fats, animal or vegetable oils.

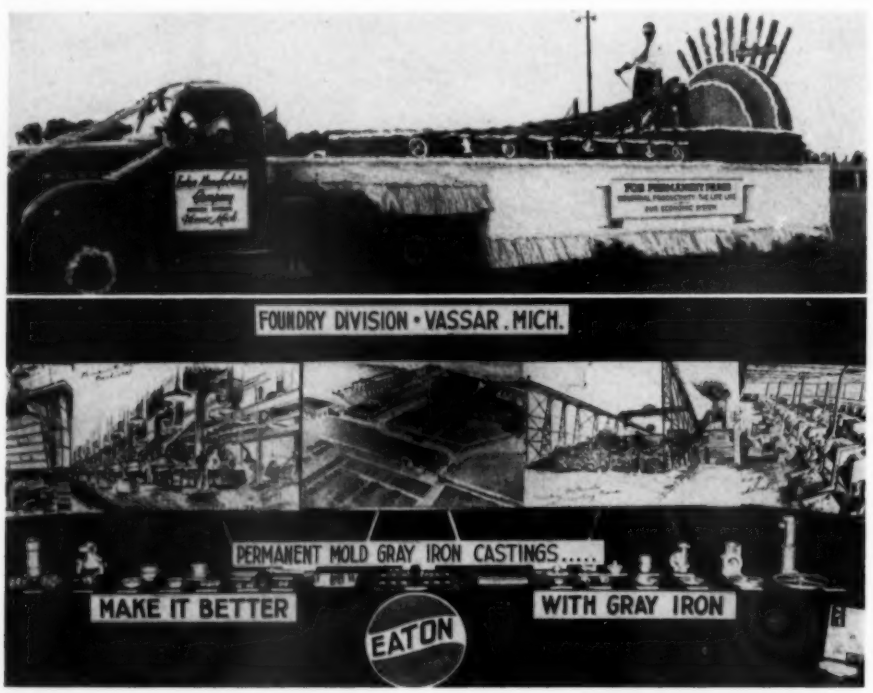
A slightly stronger ceramic is needed for plastic patterns than for wax. This can be obtained by using same ceramic mixture but cutting water content.

Has Several Forms

Silica can exist in at least six crystalline forms: Quartz, tridymite, and cristobalite, and each of these has a high and a low temperature modification. These various forms of silica differ only in atomic arrangement. In changing from low to high temperature modification, rearrangement of atoms also occurs and expansion takes place. The amount and rate of expansion differs with the type of silica as shown in Fig. 2. Cristobalite undergoes a rapid expansion at slightly under 500° F. Quartz undergoes a rapid expansion at about 1050° F. Tridymite undergoes two small expansion increases at about 250 and 325° F, but the change is much less than that of quartz or cristobalite. Fused quartz undergoes the least expansion, less than 0.1 per cent up to 1600° F, and the increase is uniform at all stages.

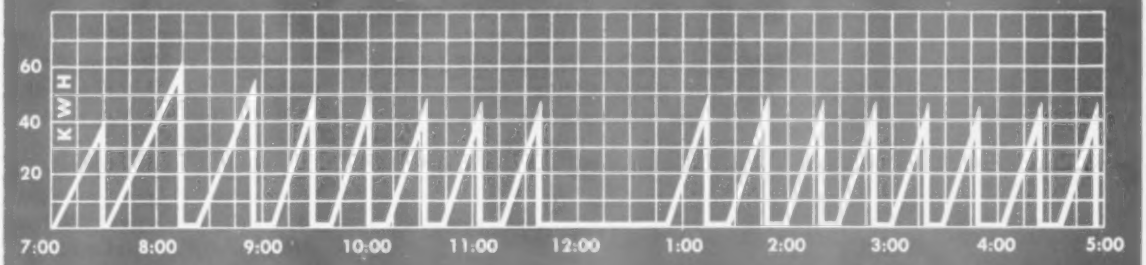
The volume of all forms of silica is comparatively constant above about 1110° F, so if silica were heated and cooled, but always remained above this temperature, there would be little cracking or spalling. However, when the material is cool and heat is applied, cracking is likely to occur at the point where the change from low to high temperature modification occurs, and similarly when cooling from above 1110° F to a temperature below the modification change point. Originally it was believed advantageous to use wax patterns since the wax shrinkage was used to offset the

(*Concluded on page* 212)



CENTENNIAL EXHIBIT: Participating in the recent centennial celebration of Vassar, Mich., the Eaton Mfg. Co.'s Foundry Division of that city sponsored the float and castings display shown here

DETROIT ROCKING ELECTRIC FURNACE



LFC—Brass

INSTALLATION—Three type LFC, 125 KW, 350 lb. nominal cold charge capacity Detroit Electric Furnaces in a Minnesota plumbing goods manufacturing company. Equipped with automatic rocking and electrode control.

OPERATION—Melt 350 lb. heats of 78% Cu, 13% Zn, 6½% Pb, 2½% Sn, and tapped into 400 lb. crucible. Operate 16 hours per day.

COSTS—1947 Average: Power 273 KWH/Ton—$3.53 • Electrodes, 410 lbs. bronze/lb. electrode—$ .66 Refractory, 5000 heats/lining—$ .72 • Melt loss, ¾% @ 17¢/lb.—$2.60

CONTROL + UNIFORMITY + SPEED

Equals BETTER QUALITY + LOWER COST

● Detroit Rocking Electric Furnaces offer year-in, year-out high efficiency, uniform output, lowest possible metal shrinkage, plus constant and positive control of atmospheric conditions, accuracy of composition and speed of operation.

All-electric operation saves handling and storing of messy, bulky fuels. Indirect arc eliminates costly carbon pick-up. The arc, established clear of molten bath at all times, assures uniform melting chamber temperatures and is automatically maintained at optimum power input.

On receipt of your production data, our engineers will furnish you with complete facts on the greater economy, constant and higher quality control, and faster output you achieve with Detroit Rocking Electric Furnaces which meet your most exacting requirements. Detroit Electric Furnaces for melting ferrous or non-ferrous metals are available in 10 to 4,000 lb. capacities, with conical or cylindrical melting chambers. For complete details, write today, to

Foreign Representatives: In Brazil—Equipamentos Industrias "Eisa" Ltd., Sao Paulo: CHILE, ARGENTINA, PERU and VENEZUELA: M. Castellvi, Inc., 150 Broadway, New York 7, N. Y.: MEXICO: Casco S. de R. L. Atenas 32, Despacho 14, Mexico City, D. F.

DETROIT ELECTRIC FURNACE DIVISION

KUHLMAN ELECTRIC CO. • BAY CITY, MICHIGAN

(*Concluded from page* 210)

expansion of the ceramic.

Fig. 3 shows a typical heating and cooling curve of a mixture of cristobalite and gypsum. Fig. 4 shows three thermal expansion curves of gypsum with various added refractory materials.

For high-temperature investments, usually two types are used—a precoat and a backup. The precoat may contain quartz, kaolin or similar high melting point material. The binder may be any one of a number of things (which will be discussed later). The precoat usually contains a wetting agent, such as aerosol, to reduce surface tension and improve adherence to the pattern.

An example of precoat is given by the following formula: 4 parts zirconia cement, 3 parts 140 mesh silica, 0.6 parts water, 0.5 parts sodium silicate, and a small amount of hydrochloric acid. Add the hydrochloric acid to the sodium silicate and stir while adding, then add the silica and stir smoothly to a smooth, creamy slip. If hydrochloric acid is added too rapidly, a lumpy slip will result and interfere with production.

The backup agent is usually some form of quartz of coarser texture than the precoat. Bonding agents may be a soluble acid phosphate, silicates, or fused metallic oxides, with water added. To show the variety of investment mixes, two specific examples are given:

1. Silica sand and flour, magnesium oxide, and brick dust are mixed together, and to this is added a mixture of tetraethyl silicate, ethanol, and hydrochloric acid.

2. 1 part zirconia cement, 1 part silica mix, (1 part 60 mesh, 1 part 140 mesh, and 1 part 250 mesh silica), stir thoroughly and add 100 parts of this mixture to 14-16 parts of water to which is added ¼ part TAM modifier. Stir thoroughly.

In some cases, such as in using frozen mercury patterns, a china clay such as kaolin is often used. It is deposited in layers up to ⅛-inch total thickness by dipping in the slurry. After baking it has a fine surface similar to china and rings when tapped. This ceramic shell is backed up with dry sand for pouring. It can withstand 3000° F without noticeable signs of deterioration and can resist the thermal shock of hot metal being poured into a cold mold.

Dip coats are used to give good surface finish since many of the investments which will withstand heat are too coarse or will react with the metal to give rough surface finish. The difference in properties between dip coat and backup leads to a large percentage of the troubles encountered in this process.

With low-temperature investments, the investment is in intimate contact with the patterns. However, with high temperature investments, a three-stage operation usually is required. First, the patterns are dipped into, or sprayed with, precoat mix, and secondly, while still wet, are sprinkled with coarse silica (about 30 mesh) and then dried. Finally, the dried, coated patterns are surrounded with the backup investment. In both cases, the base onto which the patterns have been fastened is surrounded by metal flasks which are sealed onto the base with wax. The investment is then poured into the flask and the final result is called the mold.

(*To be continued next month*)

Bibliography

1. Morey, W. A., Capt., "Industrial Status of Precision Castings," *American Foundryman*, October, 1945, p. 33.
2. Sweeny, W. O., "Precision Casting Comes of Age," *Steel*, Jan. 6, 1947, p. 220.
3. Post, Charles T., "Precision Casting With Plastic Patterns," *Iron Age*, Nov. 15, 1945, pp. 54-57.
4. Neimeyer, William I., "Precision Casting With Frozen Mercury Patterns," *Iron Age*, Mar. 17, 1949, pp. 94-97.

Protect YOUR MACHINERY with a STEARNS MAGNETIC PULLEY!

Metallic refuse can cause costly repairs and possible shut-downs but at the American Crystal Sugar plant in Moorhead, Minn., a Link-Belt installation, this Stearns Electro-Magnetic Pulley helps guard against trouble.

If you want automatic low-cost protection against tramp iron hazards, consult *Stearns Magnetic* — our engineers have the know-how and experience to solve your problem.

Years of research and development by Stearns engineers have produced an outstanding product in magnetic pulleys — the reason for their wide acceptance in all industries for removing tramp iron, for separation and reclamation of materials.

For complete specifications and operating data on Stearns Electro and Permanent Magnetic Pulleys and Pulley Separators, write for Bulletins 303 and 350.

Electro and Permanent Magnetic Pulleys and Pulley Separators to fit your needs.

Stearns MAGNETIC MANUFACTURING CO.

662 S. 28th St., Milwaukee 4, Wis.

HERE'S AN AGITATOR YOU'LL LIKE...

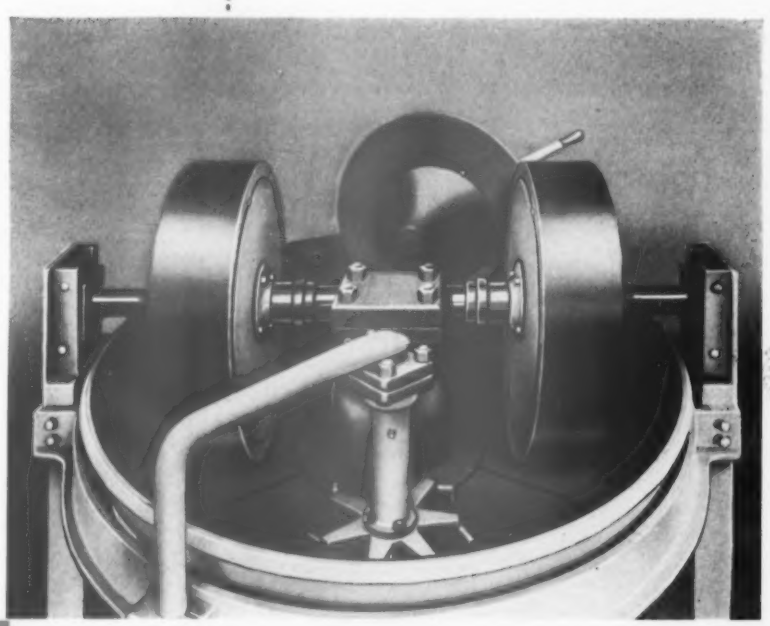
and it's in all

Clearfield Mixers

That star-shaped agitator in the pan of all Clearfield Mixers does a lot of stirring up. But it's sand, not trouble, that gets stirred and the result is six definite benefits to your sand preparation process:

1. Mixing proceeds more rapidly.
2. All lumps are broken down.
3. Formation of cakes is prevented.
4. Bottom surface freed of all material.
5. Sand quality is improved.
6. Clean emptying of pan is provided.

Whatever your sand preparation needs, there's a Clearfield Mixer with the star-shaped agitator to meet your problem. Write today for catalog No. 79 for complete details.



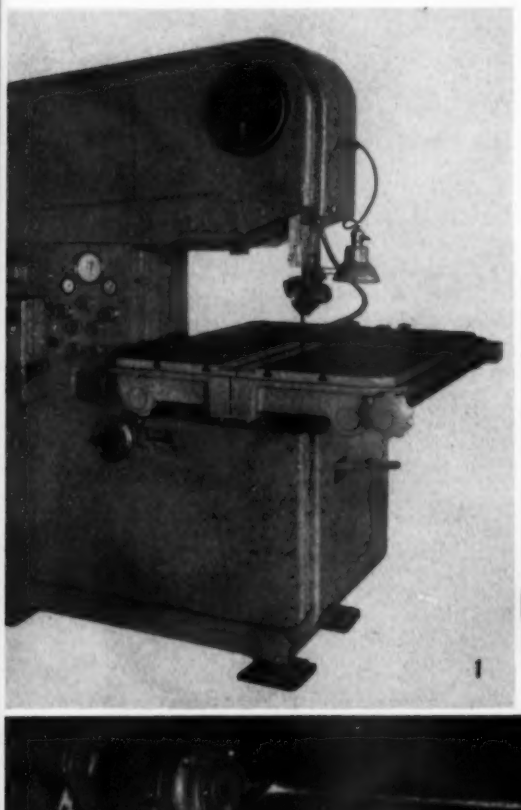
CLEARFIELD
MACHINE COMPANY
CLEARFIELD
PENNSYLVANIA, U.S.A.

NEW Equipment AND SUPPLIES

For Additional Information on these Items Use Reply Card—Page 217

(1)—Cutting Machine: Do-All Co. 254 North Laurel Ave., Des Plaines, Ill.—Semiautomatic, hydraulically controlled production tool is designed to cut every type of solid material. The machine has a 20-in. throat and 12-in. thickness capacity with a number of features governed through push-button or dial control. Computation or correct blade velocity, feeding pressure and type of blade to be used in cutting materials is shown on a job selector dial mounted on the upper door of the machine. The machine has an infinitely variable speed range from 40 to 10,000 fpm. Reciprocal movement of the work table through a 16-in. stroke is provided for automatic material feeding. Automatic controls provide that saw blade tension be built up hydraulically to the proper point before the motor circuit can be closed, no matter which button is pushed first. If the saw band breaks, automatic controls stop the machine. Work table is hydraulically tilted 45 degrees to right and 10 degrees to left. It is positioned 39 in. above the floor and contains four "T" slots for mounting fixtures and attachments. The machine is equipped with an automatic flash welder for joining saw bands from ⅛ to 2 in. wide. Band filing and polishing jobs also are performed on the machine.

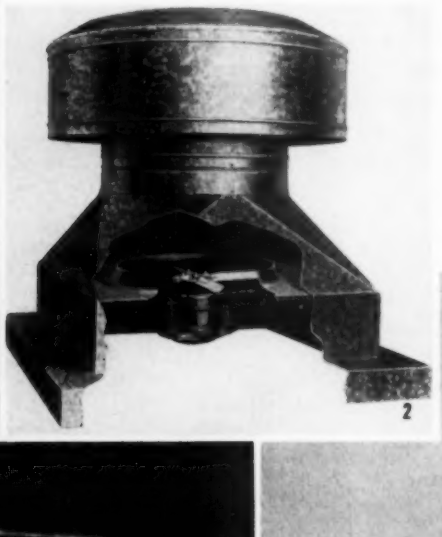
For More Details Circle No. 1—Page 217



1

(2)—Roof Ventilators: Swartwout Co., 18511 Euclid Ave., Cleveland 12— Round stationary type roof ventilators for general ventilation and miscellaneous "hot spots" of industrial and commercial buildings are made in five throat sizes—12, 18, 24, 30 and 36 in. They feature a combination damper and inverted cone air guide said to guide outgoing air with least possible friction and permit any degree of opening desired, or tightly closed. They are made both as gravity ventilators and powered units. The latter form offers capacities from 630 cfm to 25,700 cfm, according to combinations of motors, fans and throat sizes.

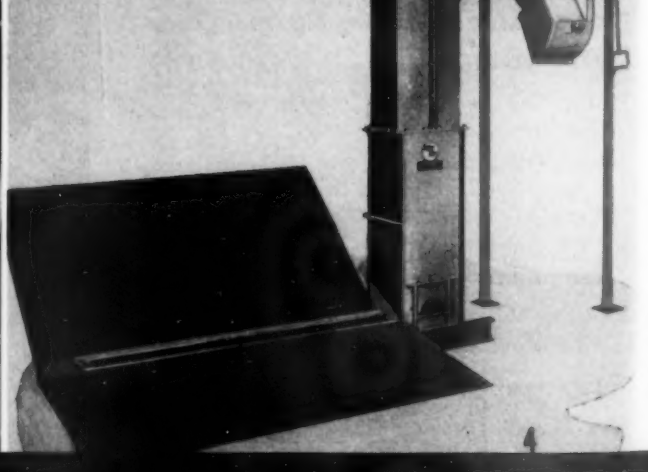
For More Details Circle No. 2—Page 217



2

(3)—Sandcutters: Sather Mfg. Co., 3330 McDougall Ave., Everett, Wash.—Sandcutter, built for

3



4

one-man operation is offered in two models—one with a cutterhead 26 x 48 in. and weighing 900 lb, the other with a 26 x 60 in. cutterhead, weighing 1100 lb. A feature claimed for the machines is a friction arrangement on the cutter hub, so designed that when one or more of the spring steel cutter teeth hits gaggers, core butts or other objects in the sand, those teeth merely stop and drag over the object, instead of breaking on them. The small and large machines are powered by 3 and 5-hp gear-head motors, respectively, and drive is furnished by four V-belts encased in full length steel guards.

For More Details Circle No. 3—Page 217

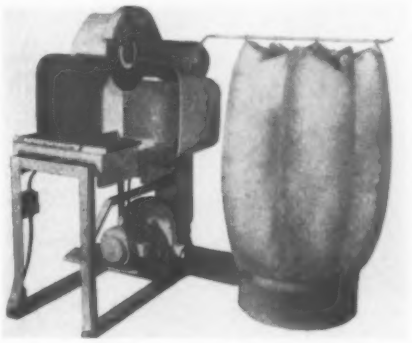
(4)—Sand Handling: Newaygo Engineering Co., Newaygo, Mich.—Packaged unit foundry sand handling system for individual floors requires no pit or foundation and can be placed in a number of positions with relation to benches or molding machines. Conditioned sand is deposited over the feeder or can be discharged onto the feeder from a portable sand conditioner. The feeder delivers sand to a bucket elevator which carries it up to an aerator at the top. The aerator discharges ready-to-use sand into the hopper over the bench or molding machine. As the hopper becomes emptied the molder pushes a button to refill it from the heap. One motor operates entire unit, and headroom requirements are said to be low.

For More Details Circle No. 4—Page 217

Overload Switch: W. C. Dillon & Co., 5410 West Harrison St., Chicago 44—Mechanism for protecting hoists or cranes from accidental overloads slips on the hoist or crane hook and the load is lifted directly beneath it in the usual manner. The "U" shaped tool steel bar of the switch opens if the hoist capacity is exceeded, cutting out the motor and preventing the operator from making the lift. The attachment is 12 in. long, inside dimensions of eye bolts are $1\frac{9}{16}$ in. wide by $2\frac{1}{8}$ in. long and their breaking strength is 29,000 lb. Switch can be set to cut off at any load between 500 and 10,000 lb. If it is not desired to attach circuit to motor for cut-off, a special switch can be supplied for attachment to a red warning light, bell, or a combination of both.

For More Details Circle No. 5—Page 217

Masonry Saws: Martin Fireproofing Corp., 2200 Military Rd., Buffalo 17—All models of the company's masonry saws are said to have cutting tables which automatically lock in place when lifted to the desired height and are released for lowering by fingertip control levers; all working parts of the blade assembly designed to function as a single unit, mounted on a pivoted arm; and welded angle iron frame, providing rigidity although the saws are portable. Separate models have varying features including dry cutting with a built-in dust collector; combination wet or dry cutting, and two models for dry cutting with no



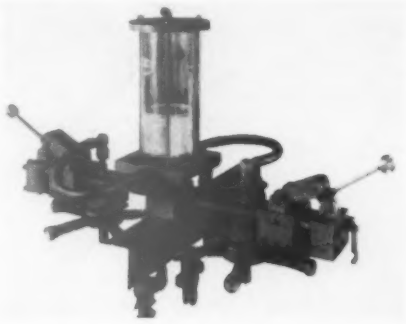
means of dust suppression. One of these has a 12-in. blade capacity and the other a 14-in. blade capacity.

For More Details Circle No. 6—Page 217

Fork Truck: Mercury Mfg. Co., 4036 South Halsted St., Chicago 9—New fork truck is designed to operate on small elevators or in congested areas. It retains the full rated capacity of the standard truck but has a reduced wheelbase of 33 in. The vehicle length has been decreased so that the overall length when carrying a 48-in. long pallet load is only 103 in.

For More Details Circle No. 7—Page 217

Conveyor Lubricator: J. N. Fauver Co., 49 West Hancock, Detroit 1—Self-contained grease lubricator for conveyors requires no external power for its operation, being driven by contact with the trolley wheels. Unit is equipped with transparent plastic reservoir which performs dual duty of liquid level gage, a quick release lever for taking the lubricator out of service, and it offers the option of a spring follower or air pressure on the reservoir for forcing the lubricant into the pumping units. In operation, as a trolley wheel approaches the lubricator the



hub engages the sleeve of one of the five pumping units which is thus automatically brought into contact with the wheel bearing. Continued rotation of the lubricator forces the pumping unit inward, delivering a measured quantity of lubricant through the fitting to the wheel bearing. Lubricator will operate on conveyor wheels equipped with or without Zerk hydraulic fittings.

For More Details Circle No. 8—Page 217

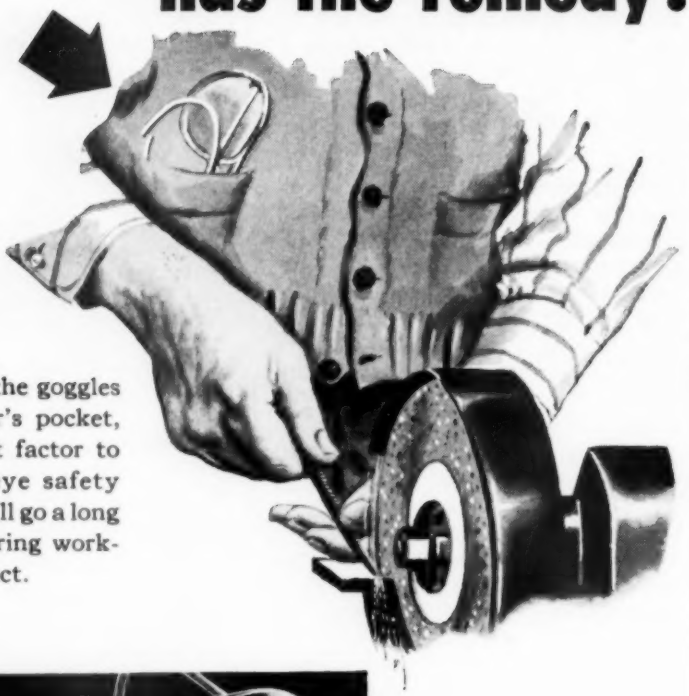
Floor Sweeper: Parker Pattern & Foundry Co., 91 Bechtle Ave., Springfield, O. New model floor sweeper is equipped with a rotating brush which permits cleaning close to walls. This brush attachment adds 6 in. to the sweeping swath. Models are available with 20 to 28 in. sweeping width. Both models have completely enclosed gears, handles of seamless steel tubing, and a removable brush reel 9 in. in diameter.

For More Details Circle No. 9—Page 217

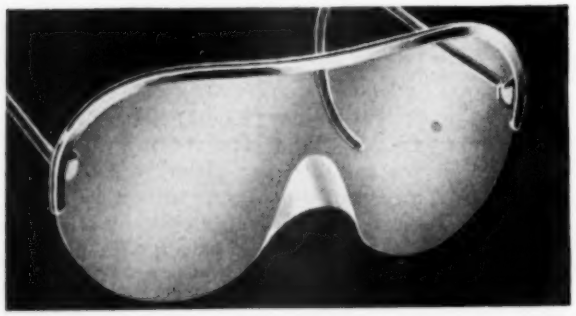
Induction Motors: Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30—Totally enclosed, fan-cooled, squirrel-cage motors have copper fins embedded in the stator laminations for additional cooling. Rapid conduction of heat from the stator is accomplished by interleaving circular copper punchings at intervals among the core laminations. These copper fins extend beyond the core iron so that the heat picked up can be transferred to the external cooling air. Additional copper fins are fabricated with steel parts to form large, cylindrical heat exchangers at both ends of the motor around the end turns. Heat picked up by internal air circulating through the rotor is transferred through these heat exchangers to the external cooling air. The motors are available in large ratings up to approximately

WILLSON . . .

has the remedy!



In order to get the goggles out of a worker's pocket, add the comfort factor to protection in eye safety equipment. You'll go a long way towards curing workers of such neglect.



FeatherSpec Style FW2

Here is comfort in nine-tenths of an ounce. WILLSON FeatherSpecs* with a large, overall plastic lens rest lightly on the nose and can be worn all day—even over prescription spectacles—without fatigue. Workers say they hardly know they are wearing any eye protection. Yet they prove adequate protection on many jobs such as light grinding, woodworking, spot welding and inspection of work in process.

If you want your investment in safety equipment to pay off—don't neglect comfort in your specifications.

NEW CATALOG

In addition to product information, it contains information on safety glass, filter glass, respiratory hazards, etc., which will help you select proper safety equipment to meet specific hazards. Send for it!

WILLSON*

"Established 1870"

*®

WILLSON PRODUCTS, INC. • 237 WASHINGTON ST. • READING, PA.

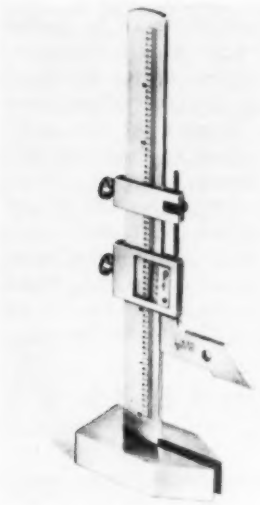
1500 hp at 1800 rpm, class B insulation, 75° C rise, and other electrical characteristics similar to those that can be obtained in standard, open, squirrel-cage induction motors.

For More Details Circle No. 10—Page 217

Abrasive: Ideal Industries Inc., 1922 Park Ave., Sycamore, Ill.—Abrasive for cleaning and polishing metals consists of a fine-grain abrasive material held together by flexible bond and molded in stick form. It is said to be nondusting, nonconductive and nonloading and finds application in commutator and slip ring maintenance and in removing tool marks, scratches or rust from metals. It is made in five sizes from ⅜ x ½ x 5 in. to 1 x 4 x 5 in.

For More Details Circle No. 11—Page 217

Height Gage: Vard Inc., 2981 East Colorado St., Pasadena 8, Calif.—Vernier height gage has a slotted



base which makes possible direct readings from 0 to 6 in. Because the vernier scale is adjustable, the zero setting can be maintained at all times. For faster operation when used for direct layout on parts, the gage incorporates a scriber point as an integral part of the jaw. A hole in the jaw permits quick attachment of indicators for all types of inspection.

For More Details Circle No. 12—Page 217

Goggle: American Optical Co., Southbridge, Mass.—Chippers' goggle has a frame of compression-molded phenolic compound which is nonflammable, moisture and heat resistant, and domed metal side screens which provide a large cup area for cooler, safe ventilation and more side vision. The individually molded, nonreflecting eyecups have large, rounded, face-contacting edges and are

(*Continued on page* 220)

HELPFUL LITERATURE

50. Casters

Rapids-Standard Co. — 12-page illustrated form WGC-49 is guide to Rapistan line of flame-hardened and steel-forged casters and wheels with double ball bearing raceways. Catalog lists metal, plastic and rubber wheels, roller and Oilite bearings and casters with capacities ranging from 250 to 2500 pounds. Specifications tables present all dimensions of each rig and wheel.

51. Polishing Machines

Buehler Ltd.—8-page illustrated booklet is entitled "AB Polishing Machines for the Metallurgical Laboratory." Multiple polishing and finishing assembly is described as well as various other type polishers and accessories.

52. Materials Handling

Lewis-Shepard Products Inc.—Illustrated bulletin No. 24 covers fields of Jacklift electric trucks for horizontal movement and Master JackStackers for both horizontal and vertical movement of material on skids and single or double-faced pallets. Different models of each style truck are shown as well as complete specifications and dimensional drawings.

53. Electric Melting Furnaces

Pittsburgh Lectromelt Furnace Corp. — 64-page illustrated catalog No. 7 discusses standard sizes of furnaces for melting and refining iron, steel, nickel and copper. Sizes described range from 100 tons to 25 pounds.

54. Bonded Refractories

Chas. Taylor Sons Co.—4-page illustrated bulletin 312 is report on development of Sillimanite mullite-bonded refractories. Space is devoted to Tasil products, such as fired brick and special shapes or cements, castables, patches and ramming mixes. Properties and applications of products are depicted and described.

55. Industrial Equipment

R. C. Mahon Co.—12-page illustrated catalog No. A-649 covers complete finishing systems for enamel, lacquer, paint or varnish, including spray pickling equipment, metal cleaning and rustproofing equipment, dry-off ovens, Hydro-Filter spray booths, automatic sludge segregators and unloaders, filtered air supply systems, drying and baking ovens, Hydro-Foam dust collecting systems, core and mold baking ovens and steel conveyor racks.

56. Protective Clothing

Sager Glove Corp.—12-page illustrated catalog "Sager Safety Safeguards" shows and describes work and welders' gloves, armored gloves and mittens, asbestos gloves and mitts, protective clothing, cup goggles, spectacles and various special items of safety apparel.

57. Cupola Chargers

Modern Equipment Co.—4-page bulletin CC 8-49 contains information on swivel type cupola charges with scale and weigh hoppers. Case histories of installations comment on savings in manpower and results in improved controlled gray iron.

58. Mobile Cranes

Coles Cranes, Inc.—8-page illustrated booklet "Coles Mobile Cranes" is guide to line of self-propelled and truck mounted cranes in capacities from 1¾ to 15 tons. Gasoline or diesel-electric drive allows clutchless operation and feather-touch one man control, and reversible steering gives normal steering irrespective of boom position.

59. Melting Pots

Meech Foundry, Inc.—4-page specification sheets 101-A is descriptive of Meechite melting pots available in capacities from 50 to 10,000 lb. Furnished in wide range of sizes for melting, holding and pouring, pots are of close-grained low nickel-chromium alloy cast iron.

60. Blast Cleaning Machine

American Wheelabrator & Equipment Corp.—Illustrated catalog on 48-in. continuous Tumblast airless abrasive blast cleaning machine relates how unit offers thorough cleaning and uninterrupted efficiency by utilizing combination of tumbling and longitudinal travel of work. Parts are fed into and discharged from machine in continuous flow.

ADDITIONAL INFORMATION?

For additional information on any of the items described under "New Equipment and Supplies", "Trade Publications" or "Helpful Literature" in this issue — simply circle their corresponding item numbers on one of these cards.

1	21	41	61	81	101
2	22	42	62	82	102
3	23	43	63	83	103
4	24	44	64	84	104
5	25	45	65	85	105
6	26	46	66	86	106
7	27	47	67	87	107
8	28	48	68	88	108
9	29	49	69	89	109
10	30	50	70	90	110
11	31	51	71	91	111
12	32	52	72	92	112
13	33	53	73	93	113
14	34	54	74	94	114
15	35	55	75	95	115
16	36	56	76	96	116
17	37	57	77	97	117
18	38	58	78	98	118
19	39	59	79	99	119
20	40	60	80	100	120

FIRST CLASS
PERMIT No. 34.9
(Sec. 510 P.L.&R.)
Cleveland, Ohio

BUSINESS REPLY CARD
No Postage Stamp Necessary if Mailed in the United States

4c POSTAGE WILL BE PAID BY—

THE FOUNDRY
Penton Building
CLEVELAND 13, OHIO

Reader's Service Dept.

THE FOUNDRY 11-49
Penton Building, Cleveland 13, Ohio

Please send literature or detailed information on subjects circled at left to—

NAME TITLE

COMPANY

PRODUCTS MANUFACTURED

ADDRESS

CITY AND STATE

This card MUST be completely filled out. Please TYPE or PRINT.

61. Polishing Machinery

Hammond Machinery Builders, Inc. —24-page illustrated catalog No. 60 covers polishing, buffing, grinding and deburring machinery; improved polishing lathes and backstands for abrasive belts; improved OD cylindrical finishing machines for tubes, bars and cylindrical stock; contour finishing machines for odd or irregular shapes; and line of 10 Junior Automatics.

62. Safety Goggles

Wilson Products, Inc.—Series of ten illustrated safety posters BM-1 to BM-10 emphasize need for eye protection. Series is entitled "What You See . . . What a Blind Man Sees."

63. Pneumatic Riveters

Cleco Div., Reed Roller Bit Co.—16-page illustrated bulletin 82 describes line of pneumatic riveting hammers. Included are light, aircraft, squeeze, pedestal, bench and yoke riveters; rivet buster and corner drills. Full specifications and rivet size capacities are given.

64. Chain Belts

Chain Belt Co.—16-page illustrated bulletin 47-15 on Rex Table-Top chain belts depicts how these belts can be used on packaging and conveying equipment. List prices, engineering data and curves for figuring chain belt pull are given also.

65. Foundry Equipment

Sterling Wheelbarrow Co.—56-page illustrated catalog No. 60 describes complete line of foundry equipment including various types of flasks, flask bars, clamping bars, pins, bushings, stub pins, core plates, wheelbarrows and accessories, core trucks and charging trucks.

66. Conditioned Crane Cabs

Dravo Corp.—12-page illustrated bulletin No. 1300 describes air conditioning systems for crane cabs operating in hot or contaminated atmospheres. Various requirements for conditioning, mechanical and functional features, and specification sheets for three different models are included.

67. Molding Machine

Herman Pneumatic Machine Co.—4-page illustrated folder "Herman Hi-speed Jolt Rollover and Draw Molding Machine" explains features of 750-lb capacity machine which utilizes smooth oil-hydraulic action for rollover and draw. Built-in automatic controls prevent jerky movement or slamming.

68. Helium Arc Welding

Linde Air Products Co.—24-page illustrated booklet F-6291A-P-23096 on Heliarc helium-shielded arc welding tells what it is, what it will do, how it saves time, equipment required and where and how to use it.

69. Two-Bearing Shakeouts

Allis-Chalmers Mfg. Co. — 4-page form 07B6365A contains description of Foundromatic two-bearing shakeouts which are available in eight sizes ranging from 4 by 6 ft with capacity of 4 tons to 8 by 10 ft with capacity of 25 tons. Multpile shakeouts are available for larger capacities. Construction features and applications are detailed.

70. Welding Rods

American Brass Co.—24-page illustrated publication No. B-13 presents information on Tobin bronze, phosphor bronze, Everdur, manganese bronze, low fuming bronze, copper, Super-Nickel, Economy bronze and other copper alloy welding rods. Recommended practice for oxyacetylene, carbon arc, metal arc and inert-gas-shielded arc welding is discussed.

71. Vibration Absorbers

Korfund Co.—4-page catalog ER-701 features Elasto-Rib cork and rubber mounting for controlling transmission of vibration and noise. Available in sheets 24 x 36 in. or cut to size and shape, mounting requires no bolting or cementing. Publication describes methods of installation and depicts three types of damper which use material.

72. Electronic Core Baking

Induction Heating Corp.—4-page publication "A Report on Ther-monic Core Baking Process" presents data on process in which green cores are passed between electrodes at speeds up to 10 fpm. Since core is heated throughout by energy transferred from high frequency field, it is heated to baking temperature in short time.

73. Materials Handling

Butler Bin Co., Carscoop Div.—8-page illustrated bulletin No. 250-A presents various electric and gasoline powered model Carscoops and shows their application in loading and unloading bulk materials including cement, ingots, foundry sand and metal scrap.

74. Crane Control

General Electric Co.—8-page illustrated bulletin GEA-2292B discusses model CR4422 direct current crane hoist control panel for Whirley, Revolver, Gantry or overhead cranes in steel mills, shipyards and loading towers. Load characteristics, accessories, and bridge and trolley controls are discussed also.

75. Vibration Absorbing Felt

Western Felt Co.—20-page illustrated pamphlet "Westsorb Vibration Absorbing Felt" analyzes many typical vibration problems in various production fields and explains in detail how they were solved with Westsorb vibration absorbing material for machine mounting. It is available in three thicknesses and densities to meet varying requirements.

1	21	41	61	81	101
2	22	42	62	82	102
3	23	43	63	83	103
4	24	44	64	84	104
5	25	45	65	85	105
6	26	46	66	86	106
7	27	47	67	87	107
8	28	48	68	88	108
9	29	49	69	89	109
10	30	50	70	90	110
11	31	51	71	91	111
12	32	52	72	92	112
13	33	53	73	93	113
14	34	54	74	94	114
15	35	55	75	95	115
16	36	56	76	96	116
17	37	57	77	97	117
18	38	58	78	98	118
19	39	59	79	99	119
20	40	60	80	100	120

THE FOUNDRY 11-49

Penton Building, Cleveland 13, Ohio

Please send literature or detailed information on subjects circled at left to—

NAME TITLE

COMPANY

PRODUCTS MANUFACTURED

ADDRESS

CITY AND STATE

This card MUST be completely filled out. Please TYPE or PRINT.

FIRST CLASS PERMIT No. 34.9 (Sec. 510 P.L.&R.) Cleveland, Ohio

BUSINESS REPLY CARD

No Postage Stamp Necessary if Mailed in the United States

4c POSTAGE WILL BE PAID BY—

THE FOUNDRY

Penton Building

CLEVELAND 13, OHIO

Reader's Service Dept.

For Dependable Cores use SMITH L-O CORE OIL

Quality castings arise from a number of things . . . chief among them — sound, accurate cores.

And, for cores you can depend upon, you'll get best results with Smith L-O Core Oil.

This time-tested, work-tested binder is available in 20 grades to meet virtually all conditions of casting . . . regardless of the kind of metal cast or type of sand used. It provides excellent workability, superior binding strength, unequalled toughness and flexibility, plus many other advantages.

Yes, to get cores that are accurate and uniform use the core oil of *absolute uniformity.* That's Dow-Therm processed Smith L-O Core Oil . . . available at the distributors listed.

Smith L-O Core Oil

WAREHOUSE STOCKS AVAILABLE
In The Following Cities

- COLUMBIAN WAREHOUSE CO. — Reading, Pennsylvania
- FOUNDRY SERVICE CO. — Birmingham, Alabama
- E. R. FROST CO. — Minneapolis, Minnesota
- MARKET TERMINAL WAREHOUSE — Buffalo 4, New York
- MALCOLM G. STEVENS — Arlington, Massachusetts
- TERMINAL WAREHOUSE — Worcester 8, Massachusetts
- TOMKINS TIDEWATER TERMINAL — South Kearny, New Jersey
- M. W. WARREN COKE CO. — St. Louis, Missouri
- WESTERN FOUNDRY SAND CO. — Seattle, Washington
- WESTERN INDUSTRIAL SUPPLY CO. — Portland 14, Oregon

Smith L-O Core Oil

CORE WASH ROD DIP LIQUID PARTING

SMITH OIL & REFINING CO
MANUFACTURERS OF L-O AND CERTIFIED CORE OILS
INDUSTRIAL OILS DIVISION . . . ROCKFORD, ILLINOIS

Prompt shipment—unlimited quantities now available to foundries from BAROID—the world's largest producer of Bentonite. Our modern plants are geared to fulfill every requirement of the foundry trade.

From THESE APPROVED DISTRIBUTORS

American Cyanamid Co.
New York, New York

The Asbury Graphite Mills, Inc.
Asbury, New Jersey

Barada & Page, Inc.
Kansas City Missouri (main office)
Also—(Branches)
Tulsa, Okla.
Oklahoma City, Okla.
Wichita, Kansas
Dallas, Texas
Houston, Texas
New Orleans, La.

O. W. Bryant Core Sands, Inc.
McConnellsville, New York

Canadian Industries, Ltd.
Montreal, Quebec, Canada
(all branches)

Casco S. de R. L.
Mexico, D. F.

The Foundries Materials Co.
Coldwater, Michigan
Also Detroit, Michigan

Foundry Service Company
North Birmingham, Alabama

Foundry Supplies Co.
Chicago, Illinois

Thomas H. Gregg Company
Milwaukee, Wisconsin

Independent Foundry Supply Co.
Los Angeles, California

Industrial Foundry Supply Co.
San Francisco, California

Klein-Farris Co., Inc.
Boston, Massachusetts
New York, New York
Hartford, Connecticut

LaGrand Industrial Supply Co.
Portland, Oregon

Marthens Company
Moline, Illinois

Carl F. Miller & Co.
Seattle, Washington

Pennsylvania Foundry Supply & Sand Co.
Philadelphia, Pennsylvania

Robbins & Bohr
Chattanooga, Tennessee

Smith-Sharpe Company
Minneapolis, Minnesota

Southwest Foundry Supply Co.
Houston, Texas

Mr. B. J. Steelman
Chicago, Illinois

Stoller Chemical Co.
Akron, Ohio

Wehenn Abrasive Co.
Chicago, Illinois

Mr. Walter A. Zeis
Webster Groves, Missouri

BAROID
SALES DIVISION
NATIONAL LEAD COMPANY

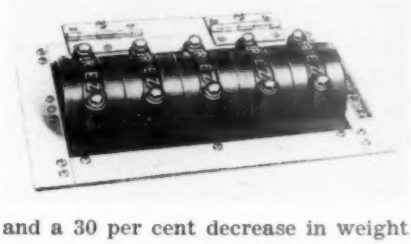
BENTONITE SALES OFFICE:
RAILWAY EXCHANGE BLDG.
CHICAGO 4 • ILLINOIS

(*Continued from page* 216)

said to withstand considerable impact. Goggle also has a chain bridge enclosed in a form-fit plastic-covered tube which rests lightly on the nose, large lens rings and one-piece rubber headband. It is fitted with regular super armorplate plano lenses, but can be had with 6 curve clear or Calobar types.

For More Details Circle No. 13—Page 217

Plate Magnets: Eriez Mfg. Co., 1095 East Twelfth St., Erie, Pa.—Newly designed permanent plate magnets are said to have a 50 per cent increase in magnetic strength



and a 30 per cent decrease in weight over the company's previous design. The magnets are designed to remove tramp iron from materials traveling in chutes and spouts or in pneumatic lines. Sizes range from 4 to 72 in. wide in increments of 2 in. Larger units or special shapes also are available.

For More Details Circle No. 14—Page 217

Core Sand Control: Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4—Pocket size hardness tester measures the hardness to which green cores are rammed in the foundry. The depth of penetration of a ½-in. diam ball into the green core is indicated on the dial of the

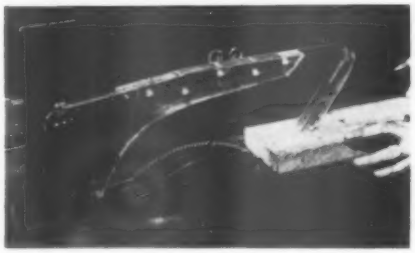
instrument and read as the hardness of the core.

Blowability of core sand mixtures can be measured and expressed in numbers by using a test corebox and sand cartridge produced by the company. The cartridge is filled with the core mixture to be tested and

placed on top of the box and the core blown with the conventional core blower. The green core hardness of a blown core, at the end farthest from blow hole, is expressed in percentage of green core hardness of the bottom end of AFS 2 x 2 in. core specimen of the same sand rammed with the AFS sand rammer. In the preparation of the standard AFS 2 x 2 in. specimen the amount of ramming energy applied must be standardized if test results are to be comparable. The work done by the falling weight is dependent on the reaction of the rammer foundation. Variables introduced by differences in rammer mounting are said to be eliminated by use of the rammer reaction base developed by the Dietert company. The company also furnishes impact test rings to check on the performance of the rammer.

For More Details Circle No. 15—Page 217

Saw Guard: Laminated Sheet Products Corp., 259 A St., Boston 10—Transparent plastic guard for circular saws of 8 to 20 in. diam keeps



the blade covered at all times, yet allows the operator a view of saw and work. Guard is furnished in two styles—one for stock of not more than 3 in. thickness and one for thicker stock. A pin arrangement allows the guard to be held in a vertical position for adjustment or changing of blades. Guard is designed for spreader mounting, but may be used without a spreader in which case mounting can be made from above or from the side.

For More Details Circle No. 16—Page 217

Metal Distributor: Industrial Equipment Co., 115 North Ohio St., Minster 2, O.—Molten metal distributor consists of a trolley ladle mounted in a rigid, all-steel, welded carrier which has a swivel hook at the top for attachment to a crane or hoist. Lifting and lowering of the ladle is accomplished through a worm and worm gear drive designed to lock in any position and hold the load without slippage. All moving parts are sealed and run in an oil bath. Bearings are antifriction type, sealed against dirt or shot. A heat deflector shield is furnished for open top ladles.

Announcing an

IMPORTANT IMPROVEMENT in POURING EQUIPMENT

INDUSTRIAL'S NEW

Distributor

Distributes Molten Metal

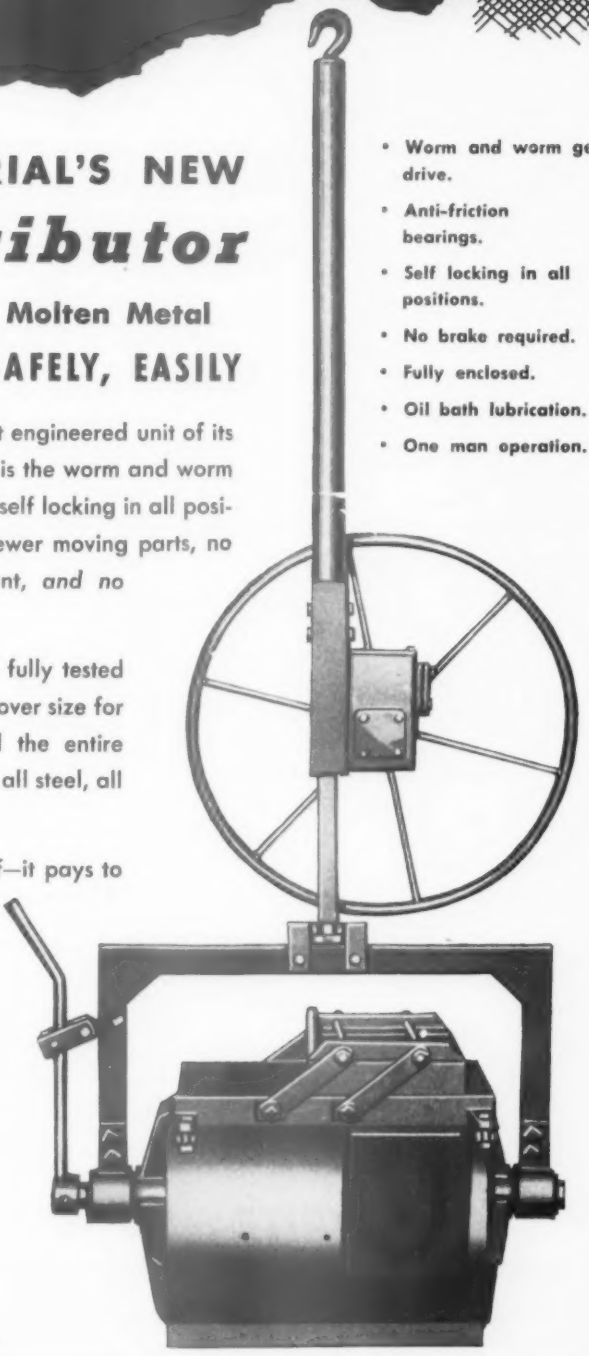
QUICKLY, SAFELY, EASILY

- Worm and worm gear drive.
- Anti-friction bearings.
- Self locking in all positions.
- No brake required.
- Fully enclosed.
- Oil bath lubrication.
- One man operation.

Here it is—the finest engineered unit of its type. Key feature is the worm and worm gear drive which is self locking in all positions. There are fewer moving parts, no need for adjustment, *and no brake!*

The *Distributor* is a fully tested unit. All parts are over size for extra strength and the entire assembly is a rigid, all steel, all welded unit.

Here again is proof—it pays to buy *Industrial.*



SIZES:

The Industrial *Distributor* is available in 700# and 1500# capacities. 2, 2½, and 3 ft. lifts available in each size.

★ Write for Descriptive Bulletin

Industrial EQUIPMENT COMPANY

115 N. OHIO ST. MINSTER 2, OHIO

Foundry work moves faster with

2 SPEED **METEOR**

ELECTRIC HOISTS

To meet demands for greater production and higher efficiency, many progressive foundries are replacing obsolete, undependable handling equipment with new heavy duty, two-speed Meteors. Designed specifically for foundry work, the Meteor provides slow speed for careful starting of loads... and high speed for fast lifting when the load is free. The Meteor is fully enclosed, weather-proofed and protected against dust and dirt. Airplane-type cooling fins quickly dissipate heat generated by gears and load brake. Low headroom, precision construction, motor thermal protection, only 110 volts in push button station, helical gears, are other quality features. If you want extra value for your investment, write today for literature and prices.

WRITE *for Bulletin 142... contains 22 pages of specifications, illustrations and prices.*

CHISHOLM-MOORE

HOIST CORPORATION

(Affiliated with Columbus-McKinnon Chain Corporation)

GENERAL OFFICES AND FACTORIES: TONAWANDA, N. Y.

SALES OFFICES: New York • Chicago • Cleveland • San Francisco • Los Angeles

The distributor is offered in 700 and 1500-lb capacities. Each size is available in 2, 2½ and 3-ft lifts. Special lifts can be furnished.

For More Details Citcle No. 17—Page 217

Balance: Fisher Scientific Co., 711 Forbes St., Pittsburgh 19—Direct reading instrument is designed for speedily weighing materials in analytical determinations to an accuracy of 1/20th of a milligram. The balance has only one pan, and the weight reads directly on a scale at eye level. All required weights are built-in and manipulated by turning four external knobs. No weights are handled. Weights less than 0.1 gram are indicated optically and automatically. Samples to be weighed can range

from 200 grams to 0.0001 gram. Knife edges and planes of the balance are sapphire, pan is gold plated, and entire case is aluminum with baked lacquer finish.

For More Details Circle No. 18—Page 217

Signal System: Panalarm Products Inc., 7218 North Clark St., Chicago 26—Industrial signal system is designed for use on process work and other applications where sound and visual alarms are required to indicate failure or changes off normal. The alarms are intended to make possible safety shut-downs, sequencing or interlocking of plant operations. They may be actuated by remote switch, thermostat or float-switch. Signal cabinets are available in multiple units up to 12 in a single cabinet and are adapted to flush mounting on central control panels or to wall mounting. The systems are completely wired and only simple wiring connections to terminal blocks are required in the field.

For More Details Circle No. 19—Page 217

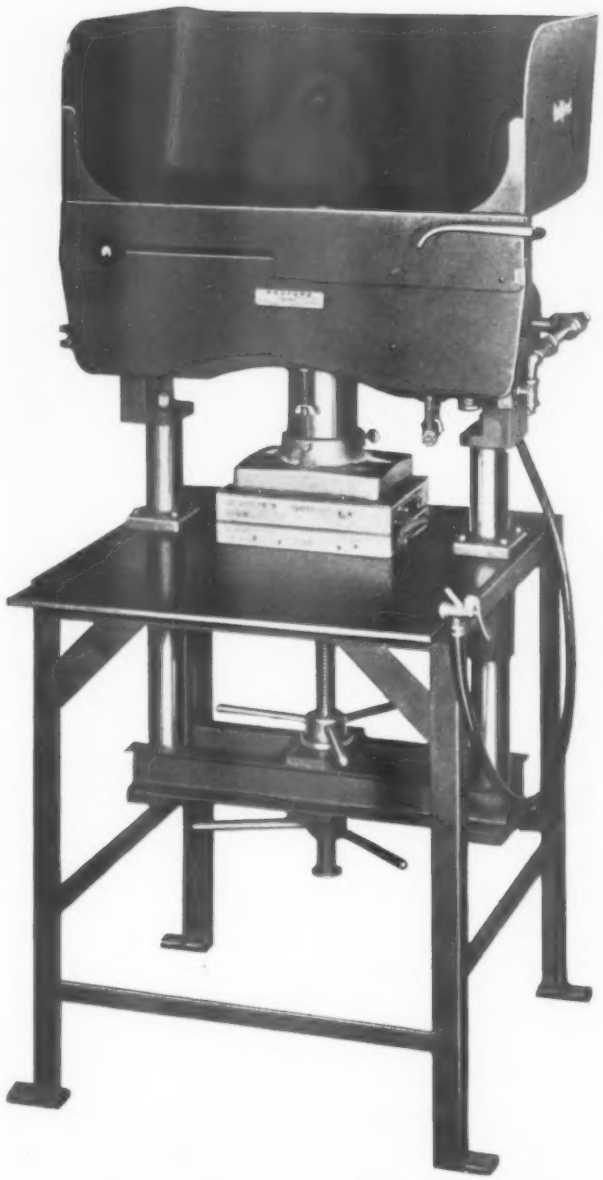
Plastic Refractory: Ramtite Co., 1803 South Rockwell St., Chicago 8—New plastic refractory (plastic firebrick) is shipped dry, premixed at the factory and requires only the addition of water in preparation for

(*Continued on page* 224)

The NEW

Redford NO. 2 CORE BLOWER

STATIONARY MAGAZINE TYPE



★ *Write for Specification BULLETIN "F"*

More production with the new and original ***REDFORD NO. 2.*** *New standards are being set, not only because the machine itself is fast, but because every motion of your operator has been correctly evaluated to obtain a maximum of production with a minimum of effort.*

8 OUTSTANDING FEATURES:

1. Large stationary work area of convenient height. All work can be done right on the machine table, eliminating unnecessary handling of core boxes.
2. Large sand supply hopper directly in front of the operator and readily accessible.
3. Stationary sand magazine that has a unique loading device eliminating the usual time and effort consuming operation of moving the magazine from filling to blowing position.
4. Easy accurate locating of core boxes against stationary magazine heads.
5. Quick change magazine heads or Redford Sand Cartridges.
6. Quick adjustment for different height core boxes.
7. Quick change, fully adjustable, automatic clamping attachment for vertically split core boxes.
8. * Actuating one handle puts the machine through the complete cycle of clamping the core box, blowing the core and releasing the core box, in two seconds.

*Any core blowing machine will blow a core in a few seconds. Related operations and human fatigue are the important factors in setting your rate of production. The New Redford has been developed to give both unequalled performance and unequalled ease of operation.

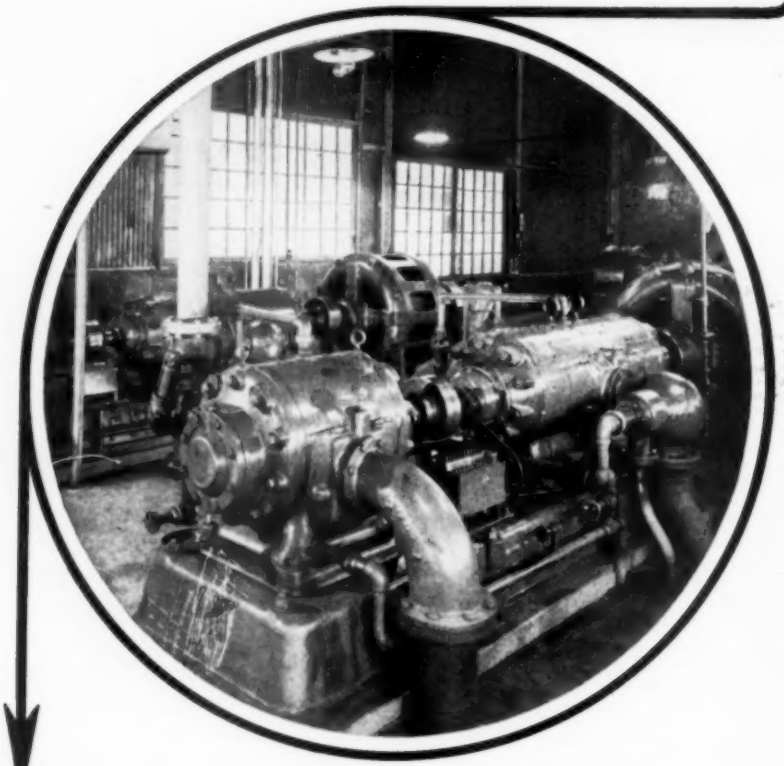
CAPACITY: Cores up to 5#.

Redford IRON & EQUIPMENT CO.

PHONE: KEnwood 1-8611

20733 GLENDALE AVENUE • DETROIT 23, MICHIGAN

HERE'S WHAT YOU GET WITH A
Fuller Rotary Compressor



DIRECT DRIVE . . . ACCESSIBILITY . . . LOW MAINTENANCE . . . SIMPLE FOUNDATIONS . . . BLADES AUTOMATICALLY COMPENSATE FOR WEAR . . . SMALL FLOOR SPACE WITH RELATION TO CAPACITY . . . MAINTAINED CAPACITY FOR THE LIFE OF THE MACHINE . . . UNNECESSARY BULK ELIMINATED . . . NO BEARING TAKE-UP . . . NO LEAKING VALVES OR SEATS TO GRIND . . . NO AIR-LINE PULSATIONS . . . NO MULTIPLICITY OF PARTS REQUIRING FREQUENT ATTENTION, ADJUSTMENT AND REPLACEMENT.

For years Fuller engineers have striven to build the best compressor money could buy . . . simple in design, easily operated, rugged construction for long, continuous service. With these thoughts in mind, it is natural that only the best of materials and workmanship go into the makeup of Fuller Rotaries. This continued effort has paid dividends, as is shown by the thousands of machines in operation and the many repeat orders from satisfied users.

An ideal unit for any plant. It will pay you to consider the outstanding features of these efficient machines. Write for Bulletin C-5 describing and illustrating Fuller Rotary Compressors.

FULLER COMPANY
CATASAUQUA—PENNSYLVANIA
Chicago 3 · 120 So. LaSalle St.
San Francisco 4 · 420 Chancery Bldg.

C-175

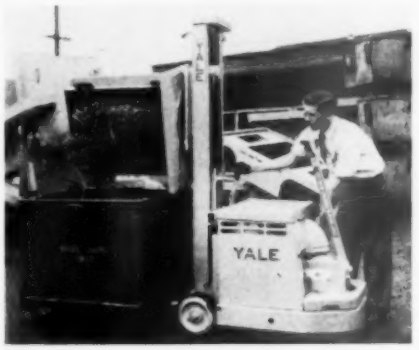
FULLER
A LIFETIME OF NEW MACHINE EFFICIENCY

(*Continued from page* 222)

use. It is available in the same three grades as the company's regular refractory. As shipped, the material can be stored indefinitely without special precaution because exposure to freezing temperatures or hot, dry atmosphere is said not to affect it. It is intended for ferrous and nonferrous melting furnaces and ladles.

For More Details Circle No. 20—Page 217

Hand Truck: Yale & Towne Mfg. Co., Philadelphia Division, 4530 Tacony St., Philadelphia 24—Nontilting, fork model, battery powered, hand truck has been equipped with a revolving fork carriage which rotates a full 360 degrees to perform tasks where the load must be emptied from one container into another. Bins used in conjunction with the truck



have short angle iron lugs welded to their sides to form a slot into which the forks of the truck fit. The slots permit the truck to lift the bin to the desired dumping height, and to suspend it while the revolving carriage rotates to dump the load. Truck is available in 1000 and 1500-lb capacities. It has a wheel base of 28⅜ in., overall width of 32 in., and an overall height of 83 in. Fork elevation is 60 in.

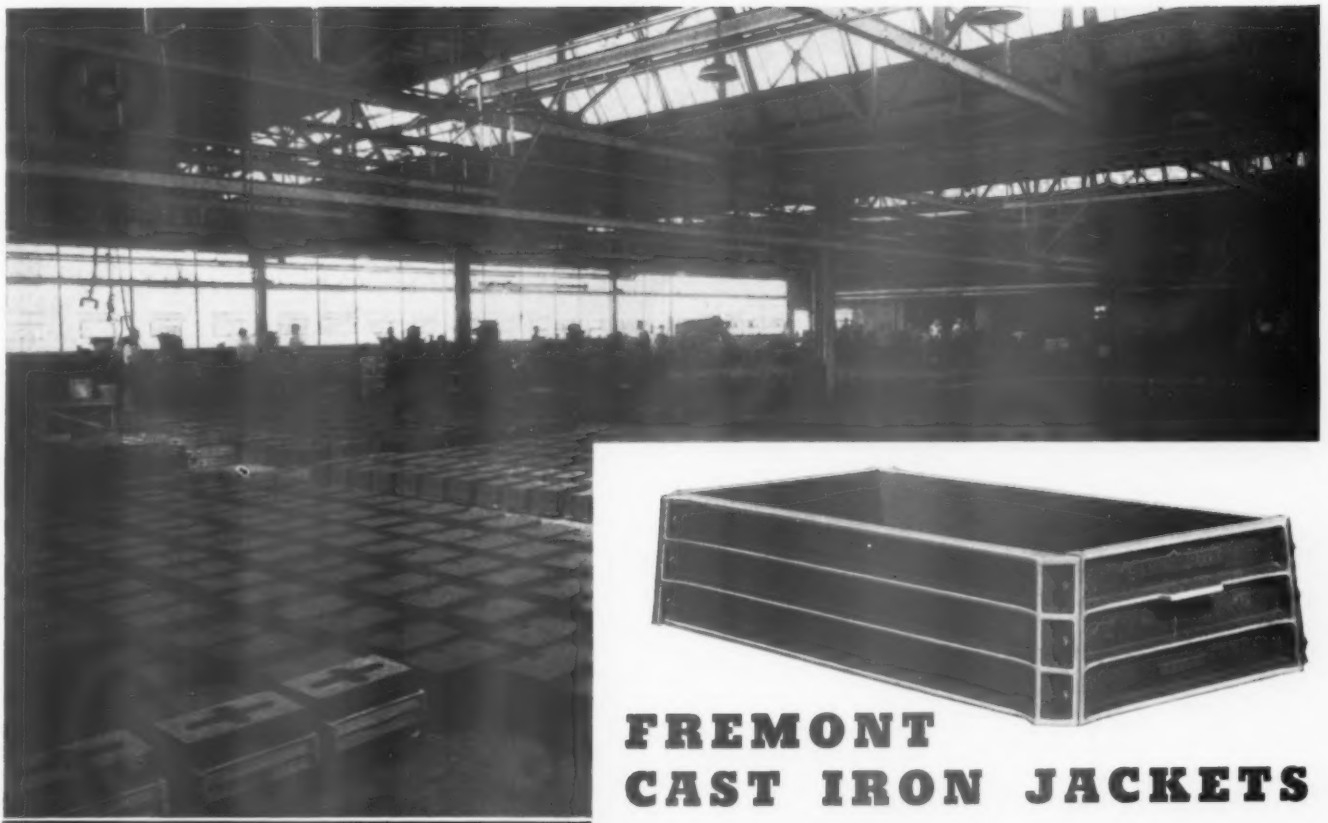
For More Details Circle No. 21—Page 217

Shot: American Wheelabrator & Equipment Corp., 505 South Byrkit St., Mishawaka 2, Ind.—Fully heat treated, steel shot, marketed under the name of Tru-Steel, has been developed for use in all types of blast cleaning equipment. Advantages claimed are that it has a long useful life; it wears down and does not break down, reducing possibility of fragments imbedding in soft work; reduces wear on blast cleaning equipment; and does the cleaning job quickly. It is available in all sizes.

For More Details Circle No. 22—Page 217

Battery Charging: General Electric Co., Schenectady 5, N. Y.—A sequence charge control which can be attached to the company's recti-

(*Continued on page* 226)



Wells Mfg. Co.'s new foundry in Skokie, Ill. Its 28,800 sq. ft. of floor is well covered by Fremont cast iron jackets and magnesium flasks. They're standard equipment.

FREMONT CAST IRON JACKETS

FREMONT MAGNESIUM FLASKS

BUILT FOR LONG SERVICE & FAST PRODUCTION

ALL ORDERS GIVEN VERY PROMPT ATTENTION

GROOVLOCK
THE FOOL-PROOF PIN

THE FREMONT FLASK CO.
Fremont, Ohio

Says THE PROPRIETOR TO THE FOUNDRY FOREMAN:

"Dang it all, Bill, we simply must get these melting costs down. Here are the figures."

Foundry Foreman (who used to work at Castright) "Castright melted in Crucibles and still does. The boss said they could always compete because his costs were the lowest in the city and rejections didn't amount to anything."

Proprietor: "Don't I know? Castright has a reputation for quality castings. You have certainly given me an idea."

Bill is right: in both the old and the newest modern foundries, Crucible melting gives the highest quality metal at lowest cost.

Crucible Melters' Handbook is mailed free on request; contains solid advice on the use and care of Crucibles.

CRUCIBLE MANUFACTURERS ASSOCIATION

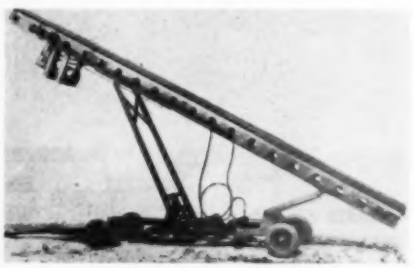
90 WEST STREET
NEW YORK 6, N.Y.

(*Continued from page* 224)

fier type truck battery chargers is designed to double their working capacity. The device is said to make it possible to charge two fully discharged batteries in 13 hr from a single rectifier. By the flick of a switch the basic characteristics of the original charger are restored so that a single battery can be charged in 8 hr.

For More Details Circle No. 23—Page 217

Portable Conveyor: Lake Shore Engineering Co., Iron Mountain, Mich.—Portable belt conveyor is equipped with hydraulically controlled belt and is mounted on a hydraulically controlled lift frame. Hydraulic system is powered with either an electric motor or gasoline engine and permits reversing action of the belt



and a range of speeds from 0 to 400 fpm. Height of the low end of the conveyor can be adjusted from 20 in. to 48 in., and of the high end, from 48 in. to 15 ft, depending upon conveyor length. It is offered in lengths from 10 ft up, in multiples of 2 ft and with belt widths of 8, 10 and 16 in. Special lengths and widths are available. Frame is mounted on four wheels with 4.00 x 8 pneumatic tires; it is equipped with a tow bar.

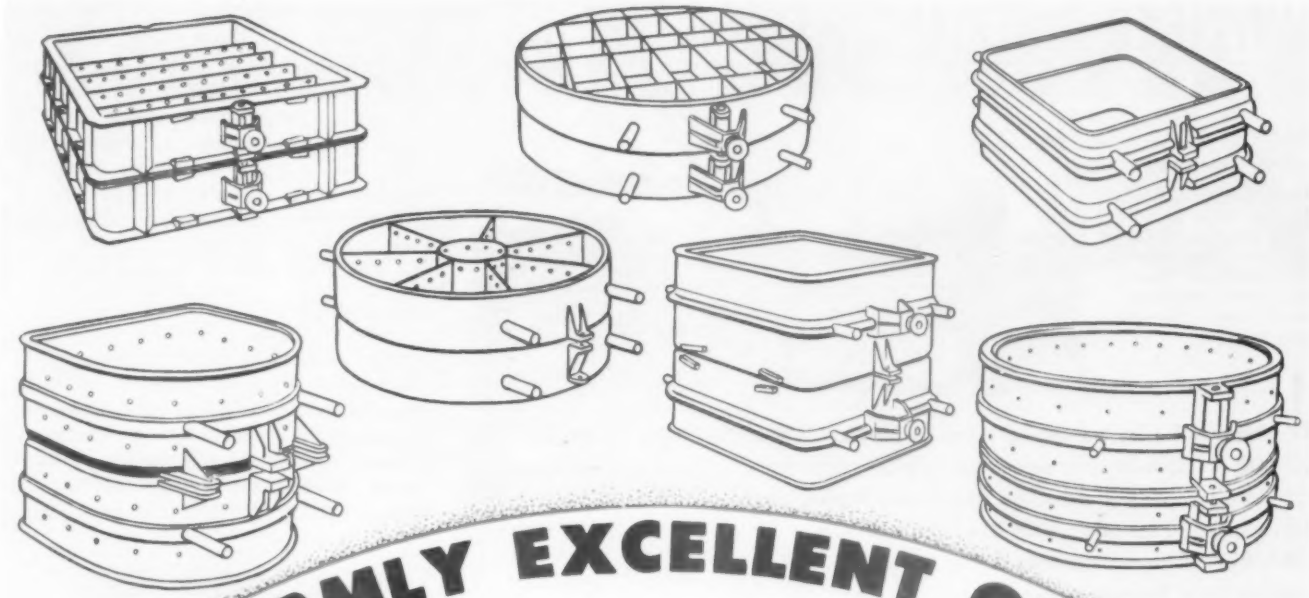
For More Details Circle No. 24—Page 217

Snagging Wheels: Carborundum Co., Buffalo Ave., Niagara Falls, N. Y.—Abrasive wheels for rough grinding and snagging operation are bonded by an improved technique which is said to produce wheels that cut freely and are capable of withstanding intense heat and severe impact shocks. The bonds are new compounds of various synthetic resins, two types of which are employed to produce a soft, fast cutting wheel for light applications and a tough, longer wearing wheel for severe operations.

For More Details Circle No. 25—Page 217

Air Conditioner: Lintern Corp., 29-2 Riverside Drive, Berea, O.—Air conditioning unit for general purpose crane cabs is designed to filter and heat or cool the air to provide normal, healthful working con-

(*Continued on page* 228)



UNIFORMLY EXCELLENT QUALITY

Thousands a year, for nearly two decades . . . yet each Foundry Flask is given individual handling each step through the Black, Sivalls & Bryson plant. That's why all sections are true and interchangeable . . . pinlugs and other equipment are set and spaced precisely . . . parting line and strikeoff are smooth with good bearing. Rigid inspection and close supervision by long-experienced foundrymen, modern production equipment and skilled craftsmen insure precision performance and long life in

BS&B Foundry Flasks

Any shape, any size, with any combination of fittings . . . made to your specifications. Welded steel construction means easier handling, lighter weight, greater strength.

BS&B originated the welded flask . . . pioneered the steel-bushed flask. The efficiency of BS&B production lines means no delay . . . one to three week delivery from receipt of order.

See your nearest BS&B Distributor, or fill in coupon and mail today to the Special Products Division, Section FF10, Black, Sivalls & Bryson, Inc., Power and Light Bldg., Kansas City 6, Mo.

AUTHORIZED BS&B DISTRIBUTOR

Birmingham, Ala. Foundry Service Co.
Boston, Mass. Klein-Farris Co., Inc.
Buffalo, N. Y. Queen City Sand & Sup. Co.
Chicago, Ill. S. Obermayer Co.
Cincinnati, Ohio S. Obermayer Co.
Cleveland, Ohio C. L. Nash
Dayton, Ohio Fenton Foundry Sup. Co.
Detroit, Mich. Wolverine Foundry Sup. Co.
E. J. Woodison Co.
Edwardsville, Ill. Midwest Foundry Sup. Co.
Elmira, N. Y. F. F. Shortsleeve Co.
Ft. Worth, Tex. Ralph A. Carlson
Los Angeles, Cal. Independent Foundry Sup. Co.
Minneapolis, Minn. Foundry Supply Co., Inc.
Montreal, Can. Canadian Foundry Sup. & Eqpt., Ltd.
Oakland, Calif. Pacific Graphite Co., Inc.
Philadelphia, Pa. Pennsylvania Foundry Sup. & Sand Co.
Pittsburgh, Pa. S. Obermayer Co.
St. Louis, Mo. M. A. Bell Co.
Toronto, Can. Canadian Foundry Sup. & Eqpt., Ltd.

BS&B FOUNDRY FLASKS

MAIL THIS COUPON TODAY . . .

Special Products Div., Section FF10, Black, Sivalls & Bryson, Inc., 27th Floor, Power & Light Bldg., Kansas City 6, Missouri

☐ Send latest facts and figures concerning BS&B All-Steel Welded Foundry Flasks.
☐ Please arrange to have Sales Representative call.

NAME _____

FIRM _____

ADDRESS _____

CITY _____ ZONE____ STATE _____

SIMPLIFIED MATERIALS-HANDLING

Among the Users

Fargo, Coeur D'Alene, Howard, United Eng. & Fdry., Columbia Malleable, Milwaukee Malleable, Birdsboro Steel, Ohio Steel, Hartford Electric Steel, Detroit Gray Iron, Etc.

KRANE KAR cuts handling time! IT LIFTS, IT TRANSPORTS, IT SPOTS THE LOADS — loads of any shape or size up to 10 tons, using hook or magnet. Efficiently handles castings, patterns, flasks, cores, molds, ingots, scrap, sand boxes . . . and, with buckets, handles sand and clay. Rubber-tired, ***KRANE KAR*** operates indoors or outdoors. Loads and unloads trucks and freight cars. In repair operations, ***KRANE KAR*** moves foundry equipment to and from repair stations, spotting them for repair and installation. Our materials-handling expert will be glad to help you. Send for Bulletin No. 69.

THE ORIGINAL SWING BOOM MOBILE CRANE
WITH FRONT-WHEEL DRIVE AND REAR-WHEEL STEER

1½, 2½, 5, AND 10 TON CAPACITIES

KRANE KAR

TRADE MARK REGISTERED

SILENT HOIST & CRANE CO. 885 63rd ST. BKLYN 20, N.Y. U.S.A.

WHY ARE YOU IN BUSINESS?

To Make a Profit?

Are you sure of making a profit on a job when you estimate for a quotation? Or are you just hoping that the figures you have used will cover all of your costs of doing business? Very quickly and at a low cost to you we can determine estimating figures which will cover all of your costs of doing business. At the same time a review of your figures at this time will point out any economies of costs that can be made which will enable you to quote low job getting prices that will make you a PROFIT.

Westover ENGINEERS

FOUNDRY MANAGEMENT CONSULTANTS

424 E. WELLS STREET PHONE BROADWAY 6401

MILWAUKEE 2, WISCONSIN

JOB EVALUATION, STANDARD DATA, PRODUCTION CONTROL, STANDARD COSTING, FOUNDRY ACCOUNTING, JOB COST ESTIMATING

(*Continued from page* 226)

ditions at all times. Unit measures 17 in. deep, 38 in. wide and 48 in. high, and is available in two models: A self-contained unit which can be located either inside or outside the cab, and a split unit with the condenser unit outside of cab and a relatively small cooling unit located inside the cab.

For More Details Circle No. 26—Page 217

Jolt Timer: Controlamix Co., 1407 North 121st St., Milwaukee 13—Jolt timer may be used on all sizes and types of molding machines for automatically insuring a predetermined number of jolt blows on each mold under production conditions. Unit features electro-pneumatic tim-

ing and is of compact, dust protected design, with the adjusting knob located outside the retaining case. A lock is provided to protect against unauthorized changing of the jolt timing setting. Timer is available as a packaged unit with valve and heavy duty type button, in a range of sizes for all types of machines.

For More Details Circle No. 27—Page 217

Lift Trucks: Barrett-Cravens Co., 4609 South Western Blvd., Chicago 9—Lift trucks, which both lift and travel electrically, are available in 4000 and 6000-lb capacities with lifting platform 20 or 25 in. wide in various lengths. All controls for lifting and travel are located in the handle. Trucks also are built to handle either single or double face pallets, with fork lengths from 36 to 60 in. The trucks have 700 lb drawbar pull and 20,000 lb rolling capacity with two speeds forward and two reverse.

For More Details Circle No. 28—Page 217

Hydraulic Cylinders: Miller Motor Co., 4027 North Kedzie Ave., Chicago 18—High pressure (2500-3500 psi) hydraulic cylinders in 10 and 12-in. bore are offered in standard models. They are available in

(*Concluded on page* 230)

THE REASONS WHY *Industrial's* THE BUY

Fabricated of Lightweight Hi-Tensile Alloy Steel
Bars and other components constructed to customer's individual specifications
Full width bearing bar for strength and rigidity where it is needed most
Parting line surfaces precision-machined
Automatically controlled continuous fillet welded seams
Hardened steel pins and bushings for "no-shift" alignment

- All Flasks Normalized and Stress Relieved
- Low Cost
- Quick Delivery

Modifications or variations of the fabricated flask section pictured available in all sizes and shapes to fit individual needs.

Write for catalog

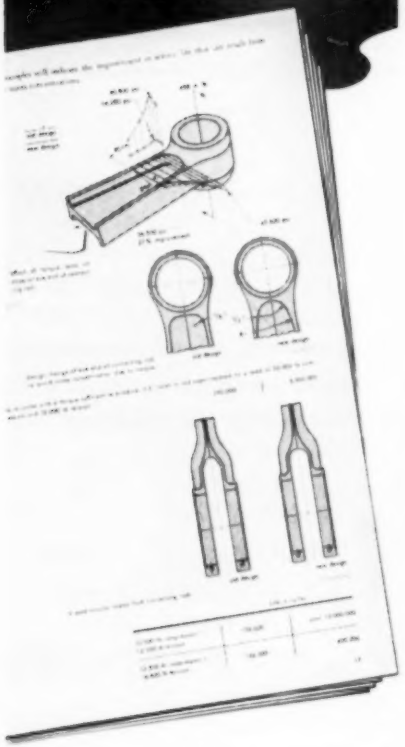
Foundry Equipment BUILT STRONGER TO LAST LONGER

INDUSTRIAL FABRICATING, INC.

TELEPHONE 6781

816 HALL STREET • EATON RAPIDS, MICHIGAN

WHAT ABOUT STRESS RAISERS?
This book gives the answers..



How to avoid the localized stresses which start failure is a basic problem of design. This 72 page booklet analyzes many good and bad features of design. It also deals with problems of steel selection and treatment from the viewpoint of the design engineer —instead of the metallurgist.

Write for "3 Keys to Satisfaction"—it is free.

Climax Molybdenum Company
500 Fifth Avenue · New York City

Please send your
FREE BOOKLET
3 KEYS TO SATISFACTION

Name.....
Position.....
Company.....
Address.....

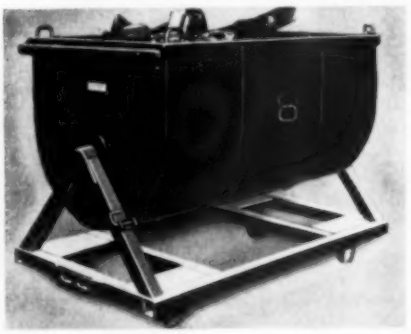
F-11 F21

(*Concluded from page 228*)

single and double rod end styles, and in a choice of piston and piston rod seals for different applications. They conform to the JIC hydraulic standard for industrial equipment and have nonbreakable solid steel heads, caps, and mountings, hard chrome plated piston rods, and replaceable dirt wiper seals. Cylinders are inspection tested at 5000 psi.

For More Details Circle No. 29—Page 217

Dump Box: Equipment Mfg. Co., 21550 Hoover Rd., Detroit 5—Portable dump box with round bottom is constructed of heavy sheet steel. Hand holds provide for tilting the box 90 degrees and the round bottom facilitates unloading and cleaning. Safety catches hold it at



loaded or tilted positions. The frame and truck are of square welded tube equipped with casters on bearings. Tow plates on the frame are optional.

For More Details Circle No. 30—Page 217

Electric Heater: Electromode Corp., 45 Crouch St., Rochester 3, N. Y.—Thermostatically controlled built-in wall heater circulates warmed air at temperatures between 55 and 85° F at floor level. Air is drawn in at top of the heater, passes through 480 to 680 sq in. of heating element and is fan-circulated out at the bottom at a rate of 125 to 160 cfm. Heaters are available in models of 1500 to 4000 w, 115 to 230 v, 5122 to 13,660 Btu, and each weighs 42 lb. Heaters are 17 in. wide, 21 in. high, 5⅜-in. deep and extend 1 in. from wall. They fit into a wall opening measuring 14¼-in. wide and 18¼-in. high.

For More Details Circle No. 31—Page 217

Motors: Sterling Electric Motors Inc., 5401 Anaheim-Telegraph Rd., Los Angeles—Totally enclosed, slow-speed geared motors are constructed for atmospheres containing nonexplosive dusts, vapors and other injurious foreign materials. The motors feature labyrinth seals, heavy-duty ball bearings lubricated for life and a specially designed rotor.

For More Details Circle No. 32—Page 217

SCIENTIFIC MATCH PLATES
Pressure Cast

Cope and Drag PLATES

SIZE . . .
Up to 61" x 79"

WEIGHT . .
Up to 800 lbs. per casting

- **Multiple pattern Cope and Drag plates can be made from a single master pattern.**
- **Our system of "backing-out" assures uniform metal thickness.**
- **Our transfer points cast on the plates aid in pinning to the flasks.**
- **See our layout sheets for data required to build backing frames and position ribs and bolting bosses.**
- **Write us for quotations on your next Cope and Drag Castings.**

The
SCIENTIFIC
CAST PRODUCTS
Corp.
1390 EAST 40th STREET
CLEVELAND 3, OHIO
2520 WEST LAKE STREET
CHICAGO 12, ILLINOIS

Why not use more

HIGH SHRINKAGE BRONZE?

(*Continued from page* 93)

constituent, zinc, of low melting and boiling points. Further that the ratio of zinc to copper is an important factor in the matter of strength. The melting unit therefore should be one which provides the most efficient control of zinc loss. From time immemorial crucible furnaces have been favored for this purpose, fired by coal, coke, natural gas, city gas or oil. Revolving electric furnaces of the resistor type and even the direct arc may be used, as well as oil-fired open-flame furnaces. For very large castings the reverberatory has been used, while the induction type also may be employed. Good quality manganese bronze can be made in any of these furnaces. For the purpose of discussing the fundamentals of melting manganese bronze let us confine ourselves to the crucible type. Of this type the writer has used crucibles of 1200 lb capacity down to 200 lb, the castings running from 1 to 8000 lb.

Melt Metal Quickly

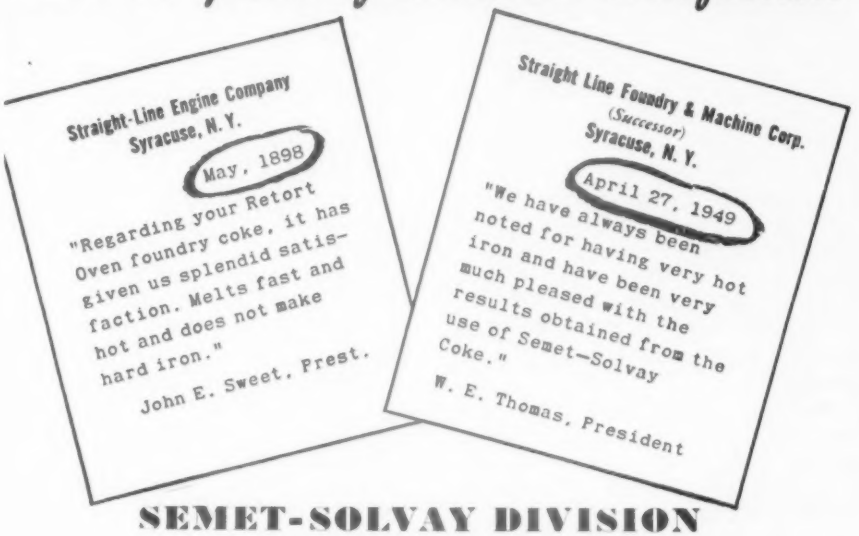
Quick melting is desirable, the furnace atmosphere being oxidizing. Consequently, the crucible, which is either a new one or one that has been used only for manganese bronze, is brought to a bright red heat before the ingots are charged. The crucible should be packed as closely as possible but should not be loaded beyond the point that prevents an old crucible bottom from being placed on it as a cover. This keeps out gases to some extent and pieces of solid fuel, if such is used. If more ingot is required to fill the crucible it is put in as soon as the first metal has melted, the cover being replaced as before. No flux or charcoal is needed. Now comes the important point. Do not fume the metal, notwithstanding that this practice is observed in many foundries.

Immediately the metal starts to fume remove the crucible, skim well and hold until, on passing a skimmer gently over the surface of the metal, only a slight incipient flare of zinc is noted. Then, and not till then, pour the metal into the molds in a manner to ensure as quiet an entry as possible, taking care that the pouring spout is as close to the sprue as possible. No deoxidizer is required and this is the only alloy that the writer pours without taking the temperature with an accurate pyrometer. The various strength manganese

SEMET-SOLVAY FOUNDRY COKE

"for Better Melting"

Over 50 years of customer satisfaction


Straight-Line Engine Company
Syracuse, N. Y.
May, 1898
"Regarding your Retort Oven foundry coke, it has given us splendid satisfaction. Melts fast and hot and does not make hard iron."
John E. Sweet, Prest.
Straight Line Foundry & Machine Corp.
(Successor)
Syracuse, N. Y.
April 27, 1949
"We have always been noted for having very hot iron and have been very much pleased with the results obtained from the use of Semet-Solvay Coke."
W. E. Thomas, President

SEMET-SOLVAY DIVISION

Allied Chemical & Dye Corporation

CINCINNATI • DETROIT • BUFFALO

In Canada: SEMET-SOLVAY COMPANY, LTD., TORONTO

ERIE SINGLE LINE BUCKETS

ILLUSTRATED is the hook-on type, for intermittent service. It is reeved and ready for operation on overhead traveling crane, monorail hoist, locomotive crane, derrick, ships tackle or any other hoisting device which has but a single hoisting drum available for bucket duty. Just slip the yoke over the crane hook.

Erie Single Line buckets are also available in the direct-reeved type for permanent installation. Describe your Single Line bucket need — we'll give you our recommendations for we build all types and sizes.

Write for Booklet 402

ERIE BUCKETS • *A Complete Line*

Erie Steel Construction Co., 10911 Geist Rd., Erie, Pa.

BUCKETS • AGGREMETERS • PORTABLE CONCRETE PLANTS

bronzes require pouring at different temperatures but these variations are taken care of by the zinc flare method.

For purposes of record the temperatures can be established and will be found to be about 1750° F for the low strength and higher for the others. Fortunately, one of the characteristics of manganese bronze is the easiness with which it flows in the mold. In some cases, when very small castings are being made, it may be necessary to cast at a slightly higher temperature, above the incipient flaring point, but this is to be avoided wherever possible. The foundry should check by analysis the loss of zinc during melting, and so establish the amount of zinc that should be added to maintain the desired composition. This zinc should be added to the metal just after skimming.

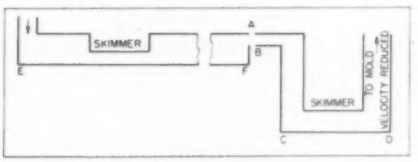
We have assumed that the mold was ready before the metal, that it was properly made and that it was static mold. Let us now consider the cardinal points in the making of the mold. To reiterate, the molds should be waiting for the metal not the metal for the molds. The mold material in the average foundry will be either dry or green natural foundry sand, or even synthetic sand. For small castings green sand is satisfactory, for large castings dry sand is to be preferred. Skin drying is not to be recommended.

Since manganese is one of the few alloys not adapted to direct pouring through risers, it is customary to admit the metal at the bottom of the mold, taking the following precautions to avoid turbulence. Bear in mind that manganese bronze simulates soap and water in its entry into any container. Agitation means bubbles, froth and trouble in general.

Entry into the mold is best made by a horn gate. This may be the old-fashioned type so long as the large end is the entry to the mold. Otherwise a squirting effect is produced, such as when one squeezes the end of a garden hose. The writer has been told, when insisting on this use of the horn gate, that mold conditions preclude its use, as the horn gate cannot be withdrawn from the mold. In such cases a horn gate can be made of lead and manipulated until a shape capable of use under the conditions prevailing, is obtained. A pattern can then be made from the lead model. Frequently a better method is to make the horn gate in dry sand, using the *principle* indicated in the accompanying sketch.

The sprue and runner in general go to *AB;* at this point the dry sand block joins up. The level of *CD* must, of course, be lower than *EF*.

We have now chosen the composition of the metal, melted the ingots, and led the metal into the mold. However, further provision has had to be made in the mold to take care of the following reactions when the metal has entered.



Horn gate made in dry sand

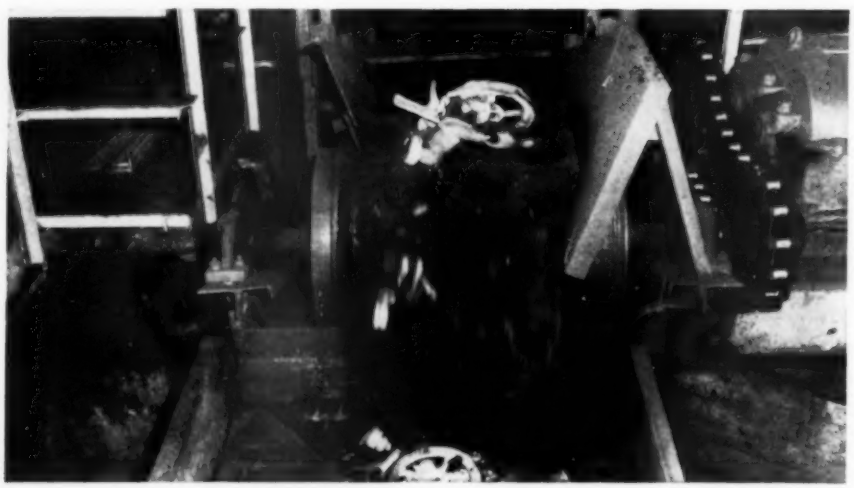
When the mold is full and the metal starts to cool, certain portions will cool and shrink quicker than others, drawing metal from the nearest available point. This means that voids will be left if there is no reservoir upon which the metal of the casting can draw. To provide for this we use risers and, to a less extent, chills.

The fundamental principle to be observed is that of directional solidification; that is, that the metal of the casting should solidify steadily towards the riser or risers. This makes it imperative that the metal in the risers be molten and hot when the casting cavity is full, so that the last volume to solidify is the riser.

The placing of risers is an individual matter for each type of casting. They must contain sufficient volume so that the final shrinkage is in the riser, not in the casting. The riser volume may be reduced by the use of insulator sleeves and exothermic additions to the metal in the riser. To ascertain if the provision has been adequate a test casting must be fractured with special reference to the junctions of the risers and the casting. The use of chills is to be avoided rather than sought, but if there is no way of feeding by means of risers, be sure that the chills are at least twice the cross section of the casting at the junction point. They must be suitably treated to cause the metal to lie quietly against them.

The case of centrifugal casting is another matter; here centrifugal force takes the place of risers.

The making of static castings in manganese bronze is straight forward if the essentials mentioned are insisted upon; and the final result will be a casting of pleasing appearence and one of strength equal to or



What's YOUR Belting Problem?

Sahara Belts are unexcelled for handling hot materials

If you use belting to handle high-temperature materials, investigate *Imperial's Sahara* Belting. One is shown above handling **red hot** castings and knockout sand. There's a Sahara Belt to meet *your* exact requirements. Sahara costs less to use because it's engineered for the job.

Made of 37½-ounce tight woven duck, impregnated with special insulation materials, *Standard Sahara* handles materials up to 300° F.; *Insulated Sahara,* up to 450° F.; *Super Insulated Sahara,* up to 600° F. Write for Data Sheet 47-8 and price list.

IMPERIAL BELTING CO.
1755 S. Kilbourne Ave., Chicago 23, Illinois

Imperial Inner-Locked BELTING

Engineered Belting—The Right Belt for Each Job

TO GET AN

ACCURATE

BRINELL

IMPRESSION

with this hardness testing machine.

Brinell Testing Machine Model J, especially designed for small shops, laboratories, heat-treat plants, schools, foundries, etc., requires no laboratory techniques. Merely lift handle to apply load. Nothing to get out of order. Accurately calibrated for loads of 500 to 3,000 kilograms. Manually operated—dead weight type; bench or floor models, also motorized. Write for literature showing other exclusive features.

SEND US YOUR TESTING PROBLEM

We can supply or develop the machine you need. Full line of hardness, transverse, tensile, ductility, compression and hydrostatic machines. Send us details of your problem.

Steel City Testing Machines, Inc.

8845 LIVERNOIS • DETROIT 4, MICH.

greater than many cast steels, with superior corrosion resistance.

The normal fracture of cast manganese bronze is somewhat conchoidal, fine grained, buff colored, and free from golden or bright yellow areas. Fineness of the grain will depend on the rate of cooling, and the composition. In any given composition the appearance of yellow spots in the fracture is most likely to be associated with high zinc above the amount called for, or lack of provision for shrinkage. It is characteristic of manganese bronze that it does not have a chilled band next to the sand but is uniformly fine grained throughout the cross section, at least up to 2 in. thick. For this reason manganese bronze is suitable for pressure castings, providing films of oxide have been kept out of the metal by taking the precautions enumerated.

It is necessary for its own protection that the foundry be acquainted with the fact that manganese bronze has a critical point at about 1000° F. Perhaps the best way to explain the critical point is to describe the following test.

Use Bend Test

Cast a keel block in manganese bronze and use one side bar for fracture and analysis, the other for tensile, and cut the keel bar itself into four equal longitudinal bars about ¾-in. square by 6 in. long. Place one of these bars in a suitable holder such as a piece of railway rail cut away so that the bar can be supported at each end and be free to bend in the middle when struck by a sledge hammer. It will be found that the bar at room temperature and as cast will bend decidedly without cracking. The extent of the bend will be a factor of the composition.

Take another bar and heat it to a bright red heat, say about 1500° F, and sumit it to the same test. It will be found to bend readily to a much greater degree without cracking. In fact it can be doubled over on itself.

Take the third bar and heat to 1000° F, remove from the furnace and immediately submit it to the same test as before. It will break at the first blow of the hammer and with much less force than that required for the other tests.

Take the last bar and heat to 1000° F and quench in water, when it will be found that it will bend in the same manner as the first bar that was bent at room temperature from the as-cast condition.

If the bar heated to 1000° F and broken be immediately quenched in water, the fracture will appear en-

SYNTRON

"Pulsating Magnet"

ELECTRIC VIBRATORS

ASSURE *FREE-FLOWING*

Bins, Hoppers and Chutes

The time it takes a man to poke or pound a bin, costs you money. SYNTRON Vibrators eliminate this cost, and save you money.

Powerful, pulsating electromagnets that bolt right to that troublesome bin, operate either by manual or gate control and break down arching and plugging of sand and other materials.

Write for illustrated folder

SYNTRON CO.

540 Lexington, Homer City, Pa.

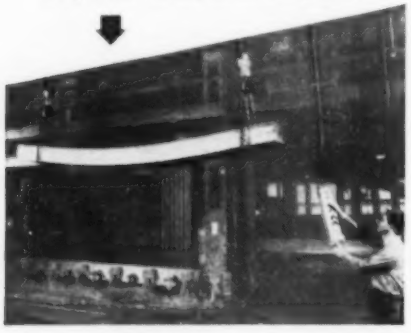
Modern Handling System

Reduces

MACHINE DOWNTIME

● To minimize downtime on a milling machine, finished flat stock had to be lifted out of the way quickly and easily. The customer, a prominent steel company, called in a Reading Engineer. A custom-built Hoist and Crane, with an extra long lift and push button control of *all* motions, was engineered and installed. Now handling of finished stock is no longer a "time-waster."

This method of engineering special handling systems, *at no extra engineering cost,* is standard practice with Reading. For full details on how you can use it to reduce handling costs and modernize operations, call in a Reading Engineer. There is no obligation.



READING CHAIN & BLOCK CORPORATION
2108 ADAMS ST., READING, PA.
Chain Hoists • Electric Hoists
Overhead Traveling Cranes

READING HOISTS

tirely bright yellow. This is the only treatment that will produce this. The change from a conchoidal buff colored fracture to that of bright yellow is very striking.

Lack of knowledge of this critical point in manganese bronze may result in the foundry accepting the responsibility for returned castings, which on account of the bright yellow fracture look as though they contain a considerable excess of zinc.

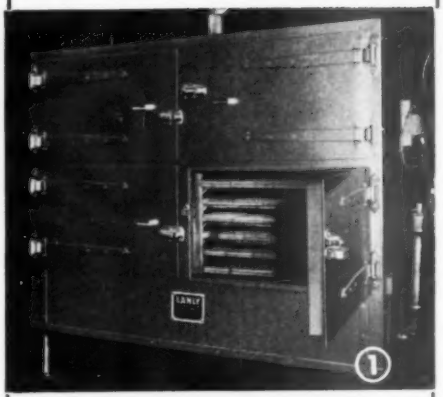
For example, the writer had a case where a casting having cored holes was required to have red hot steel pins inserted in these holes, the pins then being swaged like rivets. Evidently the surrounding bronze was heated to about 1000° F and, under the stress, broke with a bright yellow fracture. The first statement made was that the castings had not been heated, and this was true as to the whole casting, but the evidence was there as to the local heating to the critical temperature. This indicates that manganese bronze should not be quenched or heat treated except under competent metallurgical supervision.

Pour Metal In Basin

To go back to the question of pouring. In the case of large castings the pouring basin method has much to recommend it. The basin is placed over the sprue opening in the cope and connected thereto. The basin is fitted with a plug. It should have a capacity sufficient to supply all the metal needed for the casting together with its gates and risers, and enough over to leave molten metal in the basin above the hole so that the dross floating upon the top of the metal is not drawn into the casting. The metal is poured into the basin and kept there until the correct temperature is reached, whereupon the plug is pulled and the metal run into the mold. With this system the rate of pour is always the same and an opportunity is provided for keeping out the dross formed during pouring and before the metal enters the mold.

A basin 1 x 1 x 2 ft high will hold 1000 lb of metal. The pressure due to the 2 ft of metal, at the start of pouring, will equal about 8 psi. If the down gate from the basin is 3 ft from the basin to the point of entry to the casting, there will be an additional pressure of 12 psi, or a total initial pressure when the plug is pulled of 20 lb. As the bottom of the basin is likely to be within 1 or 2 in. from the top of the mold, there is no pressure to speak of at the end of pouring. If pressure is desired at the top of the casting, then the bottom of the basin must be elevated accordingly. For example,

LANLY OVENS *insure* GREATER PRODUCTION AND LOWER COSTS



Typical LANLY Installations

Fig. 1—A Lanly Shelf Type Core Oven. This unit is heated by means of burners located directly under the work chamber. Available in several standard sizes.

Fig. 2—A Two Compartment Car Type Mold Drying Oven. Each compartment individually heated and controlled.

Write for Bulletins on LANLY Finishing, Cabinet Type and Heat Treating Ovens.

THE LANLY CO.
OVENS FOR INDUSTRY
780 PROSPECT AVENUE
CLEVELAND 15, OHIO

if pressure of 20 lb against the top of the mold is desired, with the idea as it were of compressing the metal, then one must have 5 ft elevation of the bottom of the basin above the mold. Of course, the diameter of the down gate has no influence on the resulting pressure per square inch. However, immediately the sprue freezes, the pressure is cut off.

Let us now consider the making of a casting in aluminum bronze. Two compositions are likely to be called for, namely 10 per cent aluminum, 1 per cent iron, 89 per cent copper; or 13 per cent aluminum, 4 per cent iron, 83 per cent copper. The former can be readily improved by heat treatment, the latter may be used when it is not desired to heat treat and yet a very strong metal is required. Physical data on these two alloys follow:

	As Cast	Heat Treated	As Cast
Aluminum	10%	10%	13%
Iron	1%	1%	4%
Copper	89%	89%	83%
Yield point	30,000	70,000	42,000
Elongation	8%	8%	0-4%
Tensile strength	50,000	90,000	80,000
Brinell Hardness	160	200	300

Heat treating involves a number of variables, such as nature of furnace, rate of heating, cross sections of casting, etc., and reference should be made to the *Metals Handbook*, 1948 edition, and others. Each casting will be found to require a treatment suited to itself and the prevailing conditions.

Again the writer would recommend the purchase of ingot of the desired composition. As to melting, although crucibles are satisfactory, other types of furnaces can be used with less difficulty than is the case for manganese bronze. However, let us again use the crucible furnace as our example. No flux or charcoal is required. Use an old crucible bottom for a cover, and keep crucible for use only with aluminum bronze. Lead should be kept below 0.5 per cent, better none.

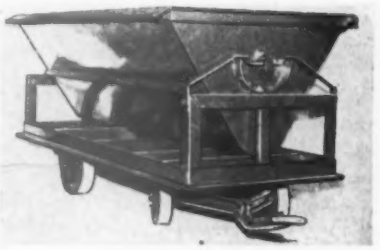
The pouring temperature is higher than for manganese namely about 2100° F. Temperatures higher than this should only be used when size of the casting at its smallest cross section requires it.

Pouring aluminum bronze should be the same as for manganese bronze. Avoidance of turbulence is essential. Shrinkage should be looked upon as, if anything, slightly more than for manganese bronze, and therefore the provision for risers and chills is similar.

Aluminum bronze has a greater

DUMP HOPPERS made especially for foundry use....

Dump hoppers are simple contrivances; they are just bins that dump. But first class, high quality, long wearing dump hoppers are something else. We designed and built them for foundrymen; they're built to give better service, they handle easier and they last longer. Pictured here are two styles: side dumping and end dumping. Wherever they are installed, they save money and improve efficiency. You will want to know more about them, of course. Simply write for our free catalog "T"; it describes and illustrates the complete Rose line of industrial materials handling equipment.



Rose heavy duty forged steel casters for every industrial purpose have proved themselves by hard use in years of service. Ask for our free attractive 20-page catalog covering the outstanding Rose industrial cas.ers.

ROSE TRUCK and CASTER COMPANY

12400 STRATHMOOR, DETROIT 27, MICHIGAN
Telephone: VErmont 7-1640
80 EAST JACKSON BLVD., CHICAGO 4, ILLINOIS
Telephone: WAbash 2-4791

NOW YOU CAN GET Sterling WOOD HANDLE WHEELBARROWS

No. S5W — for handling sand and other dry materials. 14 ga. tray. Max. cap. 4 cu. ft.

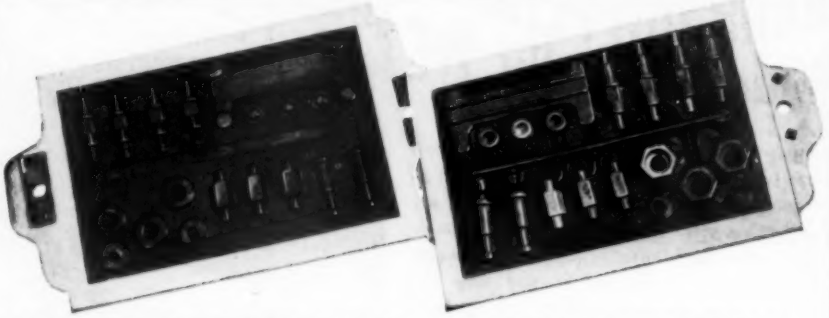
You'll like these new, lightweight, easy-wheeling Sterlings, designed for faster material transport service. Famous Sterling balanced construction puts 80% of the load on the wheel . . . only 20% on operator. Equipped with long wood handles, formed to fit operator's hands. Steel channel legs and reinforcements are just the right height. Means less stoop for operator and greater leg clearance. Steel wheel, roller bearing wheel with pneumatic tire or zero pressure cushion type wheel, can be furnished. Write for new Wheelbarrow Catalog.

STERLING WHEELBARROW CO., Milwaukee 14, Wis.

Look for this Mark of STERLING Quality

Sterling WHEELBARROWS

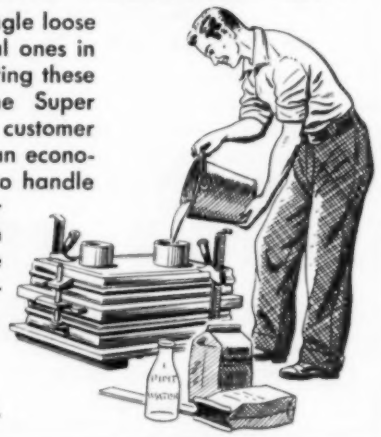
A 5652-1/4A



WHY LOSE MONEY ON "LOOSE" WORK?

. . . when you can make loose patterns pay good dividends by combining your runs the SUPER TAMASTONE WAY.

The plates shown here are made from single loose patterns. The foundry made white metal ones in multiples to balance the run. By converting these loose pattern odds and ends into the Super Tamastone match plate shown above, the customer received fast delivery on his castings at an economical price, and the foundry was able to handle the job at a healthy profit. Super Tamastone also speeds production on large cope and drag molding. Can we be of help to your foundry superintendent? *Write today . . .*



TAMMS INDUSTRIES, INC.
(formerly Tamms Silica Co.)
228 N. La Salle St., Chicago 1, Ill.

ALUMINUM

CEMCO
CLEVELAND ELECTRO METALS CO

For Casting
sand
permanent mold
die casting

For Deoxidizing
bars
shot
Ey-bars

Consult us on your Aluminum needs

THE CLEVELAND ELECTRO METALS CO.
CLEVELAND 13, OHIO

MEMBER—ALUMINUM RESEARCH INSTITUTE

tendency to gas than manganese bronze. If a heat which gives a swelled ingot when cast into an iron mold is merely returned to the crucible and remelted without any flux or cover, it will frequently be found that the trouble has been rectified. Attention to the furnace flame is important; it should be oxidizing. The pouring basin is also a good method when castings are large.

The fracture of aluminum bronze varies greatly according to the thermal history of the metal. Cast in an iron ingot mold the fracture is buff colored, homogeneous, but somewhat striated.

Cast in sand and quenched in water it may have a light fawn color, and the appearence of a honeycomb; that is, an aggregate of hexagonal crystals as much as ⅛-in. diameter.

Variables Affect Fracture

The maximum temperature to which the metal has been raised during melting, the temperature of pouring and the rate of cooling, not to mention provision for shrinkage, all make for a variety of fracture. A cross section of 2 in. will give a uniform fracture without any visible chill effect. It is typical of aluminum bronze of the heat treatable variety already mentioned that it may have unusually large crystals and yet good physical characteristics.

For ordinary purposes the best results are obtained by knocking out the castings as soon as they are solid, brushing off the excess of sand with a wire brush, thereby hastening the cooling. Leaving the castings to cool in the sand results in large crystals and in some respects inferior physical constants.

As in the case of manganese bronze the making of high quality castings in aluminum bronze is not really difficult if the various procedures are strictly followed. And after all, attention to detail should be the rule in the making of castings from any metal.

The resultant castings will compare favorably with steel for strength, and for fatigue values they are superior to manganese bronze.

Issues Brochure

East St. Louis Castings Co., East St. Louis, Ill., has published a brochure illustrating and describing operations in the various departments of its foundry. Also included are views of typical castings produced by the company and a discussion of the service the company offers its customers for gray iron castings.

...TRADE PUBLICATIONS...

For More Details on these Items Use Reply Card—Page 217

GEARMOTORS: Link-Belt Co., 307 North Michigan Ave., Chicago 1—Booklet 1815A covers the company's gearmotors and describes double and triple reduction units of new design with the motor mounted concentrically in line with the output shaft. Dimensions are shown for motors having open drip-proof, splash-proof, totally enclosed and explosion-proof motor enclosures.
For More Details Circle No. 90—Page 217

FOUNDRY PRACTICE: Foundry Services Inc., 280 Madison Ave., New York 16—Booklet 95 contains discussions on porosity in nickel silver castings, iron founding, and designing molds for gravity diecasting. Included are discussions of the company's degassing, deoxidizing, and fluidity improvement compounds as well as core and mold coatings.
For More Details Circle No. 91—Page 217

MALLEABLE IRON: Belle City Malleable Iron Co., 1442 Forest St., Racine, Wis.—Folder 8 in a series of advertising leaflets outlines the claims and qualifications of malleable iron to rank as a prime metal for mobile equipment in its widest sense. Foundry procedures used to produce quality castings are shown.
For More Details Circle No. 92—Page 217

MATERIAL HANDLING: Silent Hoist & Crane Co., 885 63rd St., Brooklyn 20, N. Y.—Bulletin 89 contains a number of illustrations showing the company's swing-boom, mobile crane in action in various materials handling applications. Comments of users of the machine are included.
For More Details Circle No. 93—Page 217

INDUSTRIAL BUILDINGS: McCloskey Co. of Pittsburgh, 3400 Liberty Ave., Pittsburgh 1—Illustrated catalog describes a design principle for economical steel building construction without a network of trusses. Special applications, either conventional or eccentric in design, are discussed.
For More Details Circle No. 94—Page 217

INDUCTION HEATING: Ajax Electrothermic Corp., Ajax Park, Trenton 5, N. J.—Technical bulletin 28 discusses low-frequency induction heaters for autoclaves, die nozzles, stress relieving, shrink fits and other applications.
For More Details Circle No. 95—Page 217

FURNACES: Burrell Technical Supply Co., 1942 Fifth Ave., Pittsburgh 19—Bulletins 315 and 515 deal with box and muffle electric furnaces for low and high temperature operation. Various models for analysis, control and production in chemistry, metallurgy and manufacturing are described.
For More Details Circle No. 96—Page 217

METAL FRAMING: Unistrut Products Co., 1013 West Washington Blvd., Chicago 7—Illustrated catalog 500 contains information on how to frame, hang, support and mount equipment of all kinds with metal framing units. Various sizes of the units and construction accessories are described.
For More Details Circle No. 97—Page 217

INDUSTRIAL MODELS: Marco Mfg. Co., 132 East Crosier St., Akron 11, O.—Folder shows examples of the company's work of producing mockups and other advance study equipment to customer specifications as well as master models, molds, patterns, jigs, fixtures, and forms.
For More Details Circle No. 98—Page 217

AIR COMPRESSORS: Worthington Pump & Machinery Corp., 401 Worthington Ave., Harrison, N. J.—Bulletin H-620-B30 describes and illustrates the company's air compressors and dry vacuum pumps. A section discusses selection of the proper compressor for a given application.
For More Details Circle No. 99—Page 217

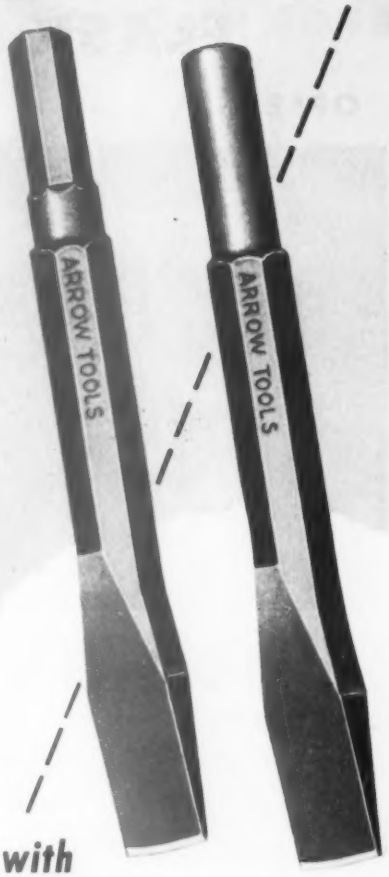
CHAIN: S. G. Taylor Chain Co., 41 141st St., Hammond, Ind.—Bulletin gives specifications on sizes ¼ to 1¾-in. diam inclusive; working load limits, definitions and cautions, recommended use and details of chain service for alloy steel chains, sling chains and attachments.
For More Details Circle No. 100—Page 217

STARTERS: Trumbull Electric Mfg. Co., Plainville, Conn.—Circular TEC-317A contains dimensional data and suggested specifications on the company's TT manual starter which provides overload protection for small motors up to 1 hp.
For More Details Circle No. 101—Page 217

ALLOYS: Cerro de Pasco Copper Corp., 40 Wall St., New York 5—Folder describes briefly and lists applications for low temperature melting alloys produced by the company.
For More Details Circle No. 102—Page 217

LIFT TRUCKS: Barrett-Cravens Co., 4609 South Western Blvd., Chicago 9—Bulletin 4861 presents descriptive data and illustrations of

MOST for your money



with **ARROW TOOLS**

Costs are reduced by economies in the plant, and chipping is no exception.

Arrow has been serving the foundries with good tools for 35 years, and now with our increased production, we are able to give you better tools at lower prices.

The finest alloy tool steel obtainable is used in Arrow tools. There is no stinting on quality.

Arrow tools are ready and waiting to serve you now. Write for your copy of Bulletin FM.

Blanks are available for those who prefer to make their own.

ARROW TOOLS inc.
1902 S. KOSTNER AVE., CHICAGO 23

ONLY A

Stripper

(PATENTED)

MECHANICAL

FLASK

OFFERS A

NON-TIP

COPE

AT LAST... a cope that can be set on its side without tipping or rocking! It's just one of many *exclusive* STRIPPER features that are saving time and money in America's leading foundries.

☆ ☆ ☆

STRIPPER flasks and jackets can be supplied promptly in either 4° or 5° taper, to any dimensions. Special shapes are available on order.

• THE FACTS are yours for the asking. Ask your local supply house, or write today for literature . . . or for prices and delivery information on your particular requirements.

General Foundry Service Corporation

516-23rd Avenue

OAKLAND 6, CALIFORNIA

three battery-powered lift trucks which make it possible to handle heavy skid, pallet and truck loads of materials with a minimum of effort. Illustrations include operating views and closeups of advanced electrical and mechanical features. Information on batteries and chargers is also included.

For More Details Circle No. 103—Page 217

MAGNETIC SEPARATORS: Eriez Mfg. Co., 906 East Twelfth St., Erie, Pa.—Catalog 14 discusses permanent nonelectric magnetic separators and electronic metal detectors. Specifications regarding weights, sizes and strength comparisons, and tables of operating capacities are included.

For More Details Circle No. 104—Page 217

OIL BURNERS: Hauck Mfg. Co., 124-136 Tenth St., Brooklyn 15, N. Y.—Catalog 409 describes low pressure air atomizing oil burners and combination oil and gas burners, explaining the principle of operation and listing capacities and dimensions. Burner accessories also are listed.

For More Details Circle No. 105—Page 217

V-PLY BELTING: Multi-V-Drive Sales Division, Worthington Pump & Machinery Corp., P.O. Box 953, Buffalo 5—Bulletin V-1400-B18 provides complete details and horsepower ratings of a quick detachable V-belting designed to service emergency breakdowns.

For More Details Circle No. 106—Page 217

SANDCUTTERS: American Wheelabrator & Equipment Corp., 599 South Byrkit St., Mishawaka, Ind.—Booklet 5 describes advantages of sandcutters over hand mixing. Four types of sandcutters are shown for use on light, medium and heavy floors.

For More Details Circle No. 107—Page 217

POWER WHEELBARROW: Kwik-Mix Co., 126 Milwaukee St., Port Washington, Wis.—Illustrated catalog describing a power wheelbarrow contains schematic diagrams, engineering specifications and a summary of design and performance.

For More Details Circle No. 108—Page 217

CASTERS: Rapids-Standard Co., Dept. WC-305, 342 Rapistan Bldg., Grand Rapids 2, Mich.—Catalog WGC-49 describes and illustrates metal, plastic and rubber wheels; roller and oilite-type bearings; and casters. Specification tables are included.

For More Details Circle No. 109—Page 217

MIDGET MILLS: Severance Tool Industries Inc., 753 Iowa St., Saginaw, Mich.—Catalog 17 lists technical information and prices of midget mills and suggests uses of the various tools described.

For More Details Circle No. 110—Page 217

1858 ★ ★ ★ 1949

91

YEARS

of Competent Lumber Service to Industry

but-

specializing in lumber for the pattern shop and the foundry

★

COMPLETE STOCKS OF

GENUINE NORTHERN WHITE PINE

CALIFORNIA SUGAR PINE

NORWAY PINE

HONDURAS MAHOGANY

Kiln Dried Super Thickness Rough or Dressed

Address all inquiries to Dept. "F"—or Wire or Phone your requirements at our expense.

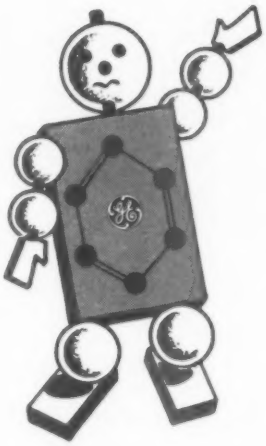
RIETZ LUMBER CO.

1802-14 N. Central Park Ave.

Chicago 47

LOWER *cleaning* COSTS

WITH G. E.'S *NEW* LIQUID RESIN CORE BINDER



Now you can cut curing times for cores by about one-half—thanks to General Electric's new liquid resin core binder—G-E 12300. For this quick-baking phenolic binder requires only about 50% of the curing period required by conventional oil binders.

Economical and easily handled, G-E 12300 is readily adapted to high and low temperature casting and to all core room techniques.

Besides a reduction in baking time, G-E 12300 gives you, compared with conventional oil binders:

1. LOWER CLEANING COSTS: resists metal penetration and sand burn-in.

2. FEWER CASTING REJECTS: gives exceptionally good permeability and low gas evolution to cores during casting.

3. LESS BREAKAGE OF CASTINGS: gives better collapsibility and quicker shakeout to cores after casting.

FIND OUT what G-E 12300 can do for you. Write for free samples and technical data to Section 44-11, Chemical Department, General Electric Company, Pittsfield, Mass.

AND DON'T FORGET—for reducing porosity of castings, G-E Permafil is available at your local G-E Distributor. Ask for it!

GENERAL ELECTRIC

CD49-V3

CORE SAND MIXERS

POWERFUL GEARED HEAD DRIVE

A BETTER MIX IN LESS TIME WITH A MULTI-MIXER

A Multi-Mixer rubs, turns, and kneads sand ten times in one revolution, five times right and five times left, at no time is material left untouched by the binders being used.

Completely **AUTOMATIC**

Controlled by "Start" and "Stop" Buttons

RUBS, AS IT TURNS, AS IT KNEADS—10 TIMES IN EACH REVOLUTION

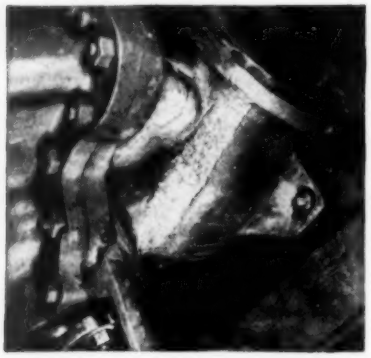
A complete, self contained unit which operates without clutch or belts. *Operation is entirely automatic, controlled by "Start" and "Stop" buttons.*

WRITE FOR COMPLETE DETAILS

Multi-Mixers are handled by nationally known distributors and are available in sizes up to 60 cu. ft.

MULTIPLEX MACHINERY CORP. ELMORE, OHIO

Don't scrap cast iron parts! Repair them...rebuild them... with *NI-ROD*



When these cast iron pump parts wore out, the question was... to repair them, or buy new ones.

Maintenance men decided to repair the parts, and keep an accurate account of costs for future reference.

The worn surfaces were built up with NI-ROD* weld deposit and ground to the original dimensions. Then the maintenance men did some arithmetic. A new pump body costs $11.76, not to speak of down-time waiting for the part to arrive. The total cost of the NI-ROD repair including labor, material and machining, was only $7.35, *a saving of $4.41 or 37%*. If you multiply this by the number of castings that give out during the year in your shop, you will understand the possibilities of repair welding with NI-ROD.

NI-ROD produces sound, *machinable* welds in cast iron without effort. Preheating is seldom necessary. NI-ROD produces a stable arc on both AC and DC, flows well, and makes a perfect bond with the iron.

Order a five-pound package of NI-ROD... and discover for yourself *why 4 out of 5 shops reorder NI-ROD,* once they've tried it. Your nearest INCO distributor stocks NI-ROD in these diameters: 3/32", 1/8", 5/32", and 3/16". *Reg. U.S. Pat. Off.

FREE: new 8-page illustrated booklet, "NI-ROD . . . a new electrode for any cast iron welding." Send for your copy today!

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N. Y.

SEND FOR FREE INSTRUCTION BOOKLET

PENN BUCKETS

No. 4-A
Self Dumping

Careful balancing makes Penn Buckets self dumping when loaded and self righting when empty. Welded construction prevents "clinging" makes them empty easily and completely.

MEMBER

WRITE TODAY FOR NEW BULLETIN DIMENSION SHEET AND PRICE LIST

PENN IRON WORKS
READING, PENNA.

"OLIVER" Oilstone Tool Grinders

keep your tools in tip-top shape

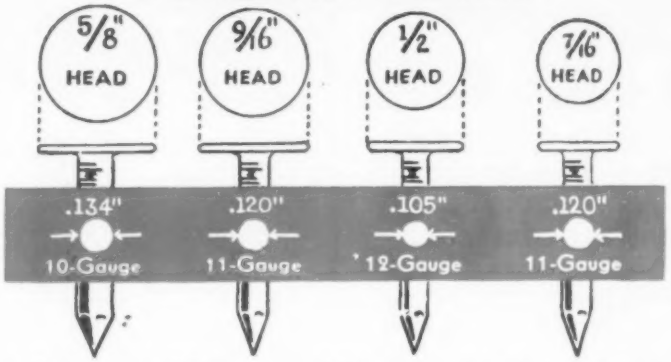
Your pattern makers know that good work demands keen tools. An "Oliver" Oilstone Tool Grinder will keep their bits, chisels, etc. extra sharp. Each of the two models shown has one coarse and one fine oilstone, a dry emery wheel with tool rest, and adjustable tilting tool rest table fitted with tool holder for parallel grinding. Model shown below is of heavier construction, and also has an emery cone and leather stropping wheel. Connect to any electric light socket.

Write for Bulletins

OLIVER MACHINERY CO.
GRAND RAPIDS 2, MICH.

ANGELL . . . PROVEN
PRESSURE PROOF CHAPLETS

Producers of SUPER HEAD FOUNDRY NAILS

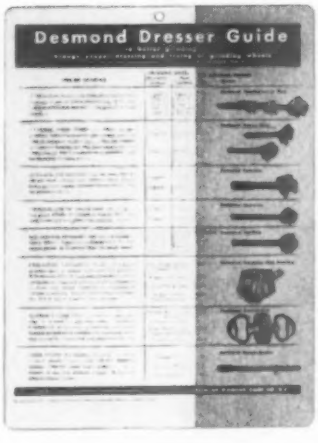


5/8", 9/16" & 1/2" Heads available up to 3 inches in length

Standard Foundry Nails available in all lengths.

All styles of Chaplets Accurately Made for Better Castings

THE ANGELL NAIL & Chaplet Company
4580 East 71st Street
CLEVELAND 5, OHIO



Practical Tips on easier grinding

Desmond's exclusive Diamo-Carbo Dresser is a favorite tool for shaping, dressing and truing small wheels on bench grinders and saw gumming wheels. . . For general use; soft and medium grade wheels, use Diamo-Carbo Dresser No. 3; for small wheels use the No. 8; and for large wheels, No. 00. . . Get your copy of the new Desmond Dresser Guide, a handy 9" x 12" wall chart which will help you select the right dressing tool for all your grinding wheels. . . The Desmond-Stephan Mfg. Co., Urbana, Ohio.

Desmond
the only complete line of grinding wheel
DRESSERS & CUTTERS

Quantity PRODUCTION of GREY IRON CASTINGS

ONE OF THE NATION'S LARGEST AND MOST MODERN PRODUCTION FOUNDRIES

ESTABLISHED 1866
THE WHELAND COMPANY
FOUNDRY DIVISION
MAIN OFFICE AND MANUFACTURING PLANTS
CHATTANOOGA 2, TENNESSEE

PressureCAST by CENTRAL

30th ANNIVERSARY

WOOD and METAL PATTERNS

FULLY MACHINED PATTERNS and CORE BOXES
of Aluminum, Magnesium, Bronze and Steel

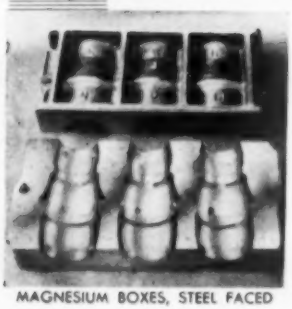
PressureCAST •PLATES •PATTERNS •CORE BOXES

PLASTIC •PLATES •PATTERNS •CORE BOXES

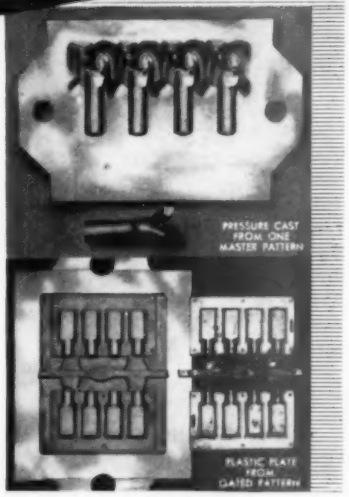
PERMANENT MOLDS and DIES

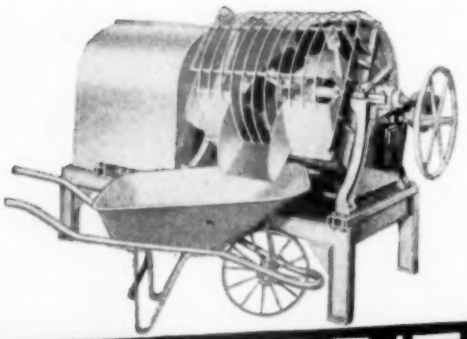
Non-ferrous Sand Castings . . . Zinc and Aluminum Die Castings

CENTRAL PATTERN CO., QUINCY, ILL.



MAGNESIUM BOXES, STEEL FACED





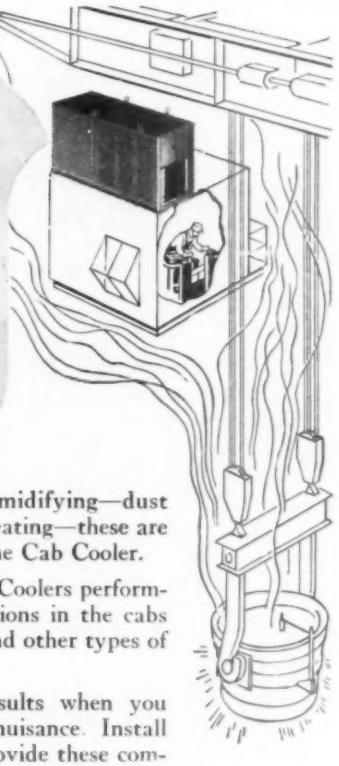
BLYSTONE • MIXERS •

THE paddle-type mixer for core sand mixing in the foundry. Blystone Mixers offer: low mix cost, thorough mixing, and easy operation. There is a sturdily built type and size for your problem. Send for Bulletin and full details.

• BLYSTONE DIVISION •
STANDARD SAND & MACHINE CO
549 W. Washington Boulevard, Chicago, Illinois

DRAVO CRANE CAB COOLERS

PERFORM EVERY AIR CONDITIONING FUNCTION



Cooling—fume removal—dehumidifying—dust filtering—ventilating—winter heating—these are the functions of the Dravo Crane Cab Cooler.

You will find Dravo Crane Cab Coolers performing these air conditioning functions in the cabs of soaking pit, ladle, stripper, and other types of hot-metal cranes.

And you will observe real results when you eliminate heat fatigue and fume nuisance. Install Dravo Crane Cab Coolers to provide these comfortable working conditions in the cabs of hot-metal cranes.

DRAVO CORPORATION

PITTSBURGH · PHILADELPHIA · CLEVELAND · NEW YORK
CHICAGO · DETROIT · ATLANTA · BOSTON
Sales Representatives in Principal Cities

DRAVO

Precision

CORE BOX VENTS

Here's part of a complete line of DEMMLER core box vents—rigidly constructed in varying sizes of slotted brass—slotted steel—and screen mesh. Orders filled promptly from stock.

BRASS SLOTTED CORE BOX VENTS

Slot widths: .010", .013", .015"
Diameters: 1/8", 3/16", 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4", 7/8", 1", 1 1/4", 1 1/2"

STEEL SLOTTED CORE BOX VENTS

Slot widths: .010", .013", .015"
Diameters: 1/8", 3/16", 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4", 7/8", 1", 1 1/4", 1 1/2"

SCREEN TYPE CORE BOX VENTS

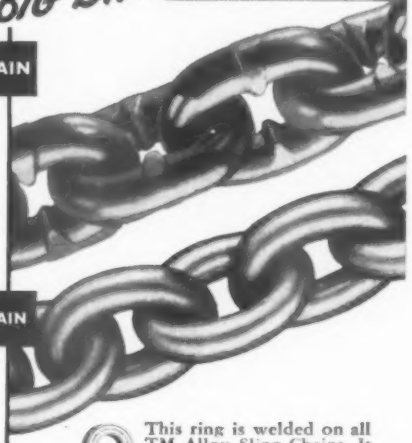
Mesh: #30, #40, #50.
Diameters: 1/8", 3/16", 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4", 7/8", 1", 1 1/4", 1 1/2"

SPECIFICATION CIRCULAR ON REQUEST

Wm. **DEMMLER** *& Bros.*
Kewanee, Illinois

On the surface they look alike—

ON THE JOB THERE'S A BIG DIFFERENCE!



1¾" ALLOY STEEL CHAIN

5 TO 15 TIMES GREATER LIFE

•

TENSILE STRENGTH: 125,000 LBS. PER SQ. IN.

•

YIELD POINT: 90,000 LBS. PER SQ. IN.

1¾" WROUGHT IRON CHAIN

SHORTER LIFE

•

TENSILE STRENGTH: 48,000 LBS. PER SQ. IN.

•

YIELD POINT: 25,000 LBS. PER SQ. IN.

This ring is welded on all TM Alloy Sling Chains. It bears the chain's serial number and safe load limit. In effect it says: "It's time to switch to TM Alloy Steel Chain. It's tougher... safer and far more economical than ordinary wrought iron chain". Used by industry generally. *Comparison, experience and costs proved its superiority.* Write for new booklet, "TM Alloy Steel Chain". The S. G. Taylor Chain Company, 42 141st Street, Hammond, Indiana.

TAYLOR MADE A GREAT NAME IN *Chain* SINCE 1873

NO PILOT'S LICENSE REQUIRED

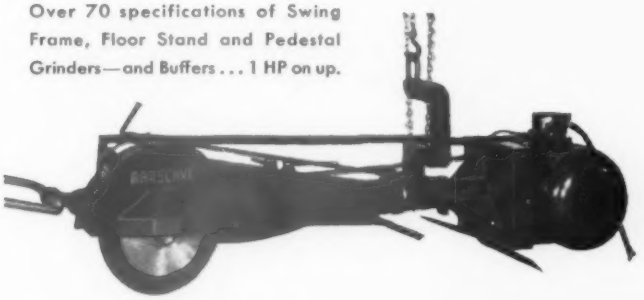
☆ You don't need a pilot's certificate to operate a Marschke Swing Frame Grinder—although even the heavy duty model (shown) responds with lighter-than-air ease to your touch. *Engineering*—from accurately machined flanges to rugged supporting frame—is the reason.

Here is real *balance*... real *maneuverability*... and more:

1. A stiff, true-running spindle—assuring steady contact between wheel and work.
2. 3-speed wheel control—assuring proper s.f.p.m.—with complete safety—for all stages of wheel wear.

For *more* stock removal, *faster*, with *less* wheel wear ... for years of trouble-free service ... do your swing frame grinder "piloting" with a Marschke.

Over 70 specifications of Swing Frame, Floor Stand and Pedestal Grinders—and Buffers ... 1 HP on up.



Shown: Marschke 24" Swing Frame Grinder.

MARSCHKE GRINDERS

VONNEGUT

MOULDER CORPORATION

1839 MADISON AVENUE • INDIANAPOLIS 2, INDIANA

HERE IT IS!

COBALT 60

now available for

INDUSTRIAL RADIOGRAPHY

High Specific Activity

Small Source Size

FAST-PRACTICAL-ECONOMICAL

Less costly than radium, Cobalt 60 is ideal where short exposure time and small focal spot are desirable, in the radiographic inspection of:

HEAVY METAL CASTINGS
WELDMENTS, PIPES, ETC.

Radium and Accessory Equipment for Industry

For further information, write to Dept. D.,

ELDORADO RADIUM

ELDORADO MINING & REFINING (1944) LTD.

P.O. BOX 379, OTTAWA, CANADA

DELIVER COMPRESSED AIR
to point of use
COOL — CLEAN — DRY

★

install a
MURPHY A. S. F.
(Aftercooler — Separator — Filter)
COMPLETELY AUTOMATIC

★

MONEY BACK GUARANTEE

Built in 1" to 6" pipe sizes and for capacities of 50 to 2,000 CFFAPM.

Write for descriptive literature.

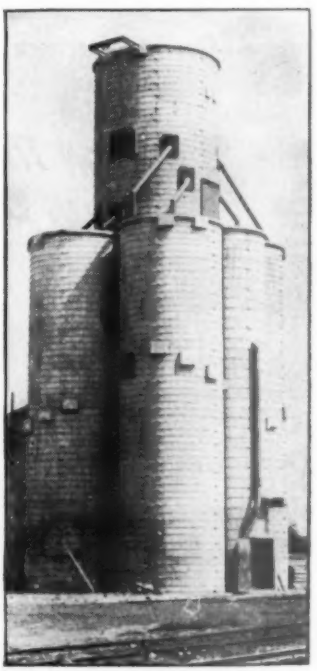
GUARANTEED COMPRESSED AIR PRODUCTS

AFTERCOOLERS • SEPARATORS • STRAINERS • TRAPS
SPRAY GUNS • PISTOL SPRAYERS

JAS. A. MURPHY & CO.
FIFTH AND VINE STREETS, HAMILTON, OHIO
Moisture Elimination Up To 3000 Pounds Per Square Inch

No. 1 of a Series

FAMOUS TOWERS



The Tower of Babel wasn't a myth, but an actual structure in lower Mesopotamia. Allegedly erected to reach heaven, its 300-ft. height would have been dwarfed by the 1,250-ft. Empire State Building.

Neff & Fry towers are famous, too — famous for the storage of coal, grain, chemicals, minerals, and many other kinds of flowable bulk materials. Often these superconcrete stave towers stand as landmarks from generation to generation due to their lasting, rugged construction.

If you want to streamline the handling of loose materials, we'll be glad to give you the benefit of our 32 years of experience in building storage structures. Our customers include many of the best known industries in America. Write, phone, or wire us for information and references.

NEFF & FRY STORAGE TOWERS

THE NEFF & FRY CO., Camden, Ohio

IT'S NEW—IT'S SENSATIONAL

AMASTEEL
TRUALLOY SHOT

LASTS MANY TIMES LONGER

Here is the peak efficiency in shot for BLAST CLEANING and PEENING.

AMASTEEL is much better than hard iron or malleable abrasives.

Investigate AMASTEEL Shot today. It lasts six times as long!

Inquire about our complete testing facilities and get a report on operating efficiency and life of any abrasive shot offered to you. Data gladly furnished. Our tests will save you money.

PRODUCERS OF
PEENBLAST
CLEANBLAST
ALLOY 99

ALLOY METAL ABRASIVE CO.
311 WEST HURON ST. ANN ARBOR, MICH.

Sure Venting with *Buffalo Brand* VENT WAX

Just a few pennies worth of Buffalo Brand Vent Wax has saved many a casting from the scrap pile. Foundries rely on this time-proven product to provide safe, sure core vents when pouring even the most intricate castings.

Send for sample.

UNITED COMPOUND CO.
328 South Park Ave. Buffalo 3, N. Y.

SMILLIE
CORE BOX VENTS
SLOTTED TYPE

Made in Sizes 1/8" to 1 1/4" in 1/16" Steps

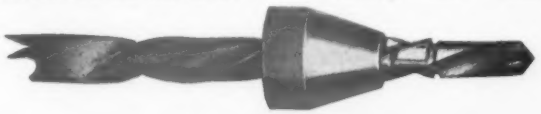
DEEP HEAD .010 or .014 Slots

SHALLOW HEAD .010 or .014 Slots

SCREEN TYPE

Made in Sizes 1/4—5/16—3/8—7/16—1/2—5/8
Specify #30 #40 or #50 Monel Mesh

INSERTING DRILLS for inserting Core Vents



C. M. SMILLIE & CO.
1124 WOODWARD HGTS., FERNDALE 20, MICHIGAN
TOOLS • PRECISION MACHINED and GROUND PARTS • FIXTURES

GLUTRIN
LIQUID BINDER

GOULAC
DRY BINDER

For

CORE WORK, SAND FACINGS, SPRAYS

Write for pamphlets giving detailed information. Both materials carried in stock by America's foremost foundry jobbers

Robeson Process Company
(Established 1905)

American Gum Products Co.
(Established 1915)

GENERAL OFFICES: 500 FIFTH AVENUE • NEW YORK 18, N. Y.

LOOK AT
WELLMAN
Some pattern prices meet other prices but quality is always worth more. There is a difference in pattern equipment.
PATTERNS
You are cordially invited to inspect our facilities to produce Well-made patterns, or write the address below. Complete layout and checking service on sample castings.
WELL-CAST MAGNESIUM, ALUMINUM AND BRONZE CASTINGS
WELLMAN
BRONZE & ALUMINUM COMPANY
2502 EAST 93rd STREET • CLEVELAND, OHIO

The extra strength of this exclusive *Angle Design* (originated and patented by Combined Supply and Equipment Co.) permits the use of these Buffalo Chaplets in thinner gauges.

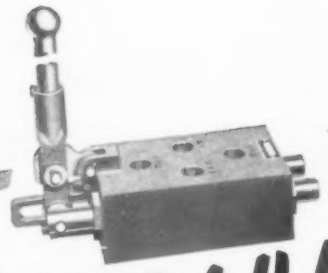
Direct advantages are the ability to burn in more easily and a greater resistance to chilling.

Thorough coating promotes immediate fusion with the molten metal.

Your requirements may be met with Buffalo "Angle Stem" (Single) or "Double Angle" Chaplets, in a range of four metal gauges. Complete information, samples and prices promptly furnished.

CATALOG NO. 15 MAILED ON REQUEST
Contains useful data on complete line of chaplets

Combined SUPPLY & EQUIPMENT CO., INC.
211 CHANDLER ST., BUFFALO 7, N. Y.



HYDRAULIC CONTROL VALVES

Pressures up to 5000 P. S. I.

● These valves are positive and fast acting. All operating parts are in pressure balance eliminating any tendency to creep or crawl. The U-shaped packers are expanded by pressure, consequently the valves seal tightly without leakage. The machined steel housings, hard chrome plated stainless steel plungers, and renewable metal valving rings, prevent wear on the U-packers, and assure users a maximum of long, efficient, trouble-free service. 2-way, 3-way and 4-way actions—½" to 4" sizes. Hand or pilot cylinder operated.

Write for complete specifications—Today!

For maximum efficiency—and satisfaction—specify

Quick-As-Wink

AIR AND HYDRAULIC CONTROL VALVES

Mfd. by C. B. HUNT & SON, INC., *Salem, Ohio*

ENGINEERING AND SALES REPRESENTATIVES IN THE PRINCIPAL CITIES

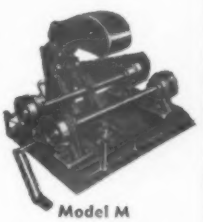
CENTRIFUGAL CASTING MACHINES

Model AS

These machines used to make ferrous and non-ferrous centrifugal castings are produced by the pioneer manufacturer of such equipment.

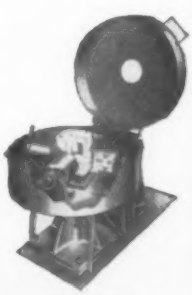
Model J

They are made in a large variety of styles and a wide range of sizes. Complete technical information is supplied concerning sand and permanent mold design, gating, sand mixes, speeds, etc.



Model M

Send us drawings or sketches of parts you are interested in casting centrifugally, and we will tell you, without obligation, if and how our machines can cast them faster, cleaner and with fewer rejects.



Model J-P

CENTRIFUGAL CASTING MACHINE COMPANY

Nathan Janco, *President*

P. O. Box 947 Tulsa 1, Okla.

WHERE FOUNDRY DUSTS OR FUMES ENDANGER HEALTH here's comfortable, approved breathing safety!

M·S·A "Comfo" METAL FUME RESPIRATOR

Harmful metal fumes are filtered effectively from inhaled air by this specifically-designed respirator. Large-area twin filters are especially processed for maximum efficiency, protected by sturdy aluminum containers—Comfo Cushion Facepiece assures gas-tight fit on any face without binding. U. S. Bureau of Mines approved. Bulletin No. CR-17.

M·S·A Clear-Vue DUSTFOE RESPIRATOR

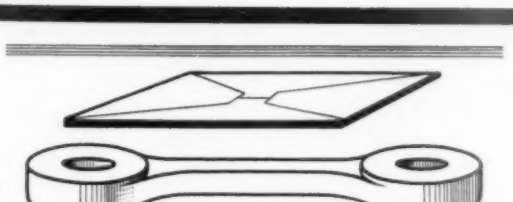
Compact, light in weight, built for hard service, the popular Clear-Vue Dustfoe Respirator is welcomed by the foundryman for its top wearing comfort as well as complete All-Dusts respiratory protection. Formable aluminum facepiece with flexible cushion enables individual shaping to the face — transparent plastic filter container shows filter condition without disassembly — inexpensive filters are readily replaceable as needed. U. S. Bureau of Mines approved. Write for Bulletin CM-8.

MINE SAFETY APPLIANCES COMPANY

Braddock, Thomas and Meade Streets · Pittsburgh 8, Pa.

At Your Service: 54 BRANCH OFFICES IN THE UNITED STATES AND CANADA

Gamma rays.....
unexposed film.....
steel casting.....



and there you have a method whereby you can increase your foundry production and improve your practice!

RADIUM RADIOGRAPHY

is new, compared with X-ray radiography, but its peculiar advantages have been finding increasing favor with steel foundries. The first commercial radiograph with radium was made in 1930—an exposure of the sternpost of the cruiser "Chester"—and by 1948 200 steel foundries throughout the country were using radium radiography. The equipment is absurdly simple, and, since it may be rented or leased, no capital expenditure is necessary. No special training is required to operate it, either. The constant activity of radium, the even dispersion of its rays with a minimum of scattering; the portability of the equipment and simplicity of operation all combine to make radium radiography a sound commercial proposition for manufacturers of steel castings. Write today for case histories and additional information.

RADIUM CHEMICAL CO., INC.

570 Lexington Ave., N. Y. 22, N. Y. Chicago: Marshall Field Annex Bldg.
3723 Wilshire Blvd., Los Angeles 5, Cal.

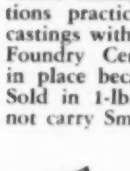
Illustration shows 60 steel castings being photographed simultaneously. The gamma rays, flying in all directions, go through all the castings at once, making 60 exposures of the 60 castings.

Make Surface Blemishes DISAPPEAR ON YOUR ALUMINUM CASTINGS

Sand holes, blow holes, pock marks, dented edges may spoil the appearance of a perfectly sound casting. Make these harmless, imperfections practically invisible on your aluminum castings with Smooth-On No. 8—the Aluminum Foundry Cement. Hardens quickly and stays in place because it expands a little as it sets. Sold in 1-lb. cans. If your supply house does not carry Smooth-On No. 8, write us direct.

Smooth - On Foundry Cements are also made in 3 different shades to match iron and steel castings, and for bronze castings.

FREE 40-PAGE HANDBOOK



Describes the applications of all the Smooth-On Foundry Cements. Also shows how to stop leaks, seal cracks and tighten loose parts of equipment with other Smooth-On Cements. 170 diagrams. Write for your free copy.

SMOOTH-ON MFG. COMPANY, Dept. 17,
570 Communipaw Ave., Jersey City 4, N. J.

Do it with **SMOOTH-ON FOUNDRY CEMENT**

Thermotrap

FOR POSITIVE PROTECTION AGAINST FROZEN AIR LINES, TANKS AND TOOLS, install Murphy Thermotraps at points in your compressed air system which are subject to freezing temperatures. They automatically eject all condensate, require no attention, no special fittings; receive no wear. Current consumption only 50 watts. Guaranteed. Write for literature.

GUARANTEED COMPRESSED AIR PRODUCTS

AFTERCOOLERS • SEPARATORS • STRAINERS • TRAPS
SPRAY GUNS • PISTOL SPRAYERS

JAS. A. MURPHY & CO.
FIFTH AND VINE STREETS, HAMILTON, OHIO
Moisture Elimination Up To 3000 Pounds Per Square Inch

SHOT and GRIT... by AMERICAN STEEL

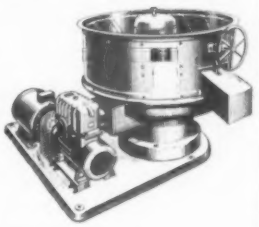
HERE'S HOW WE GIVE YOU FASTER, CHEAPER BLAST CLEANING.
100 lbs AMERICAN SHOT
100 lbs AMERICAN GRIT
American Steel Shot and Grit give you top blast cleaning performance because American's own method of manufacture assures you of uniformity of size and hardness in every abrasive pellet. American abrasives last longer, clean faster, never break apart. You get maximum economy in your blast cleaning operations. American Shot and Grit is graded to all S.A.E. specifications . . . comes in 100-lb. bags.
MEMBER

The American Steel Abrasives Company

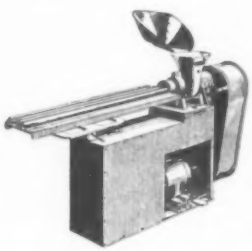
GALION, OHIO

THE DESIGNERS OF THIS FOUNDRY MACHINERY ARE FOUNDRYMEN THEMSELVES

Sand mixing without grinding or crushing the sand



FORDATH "New Type" Sand Mixer. Ensures even distribution of the bonding compound over the sand grains. Time for mixing, 2 minutes; discharging, 30 seconds. Drive, gears and bearings fully protected and lubricated. Five models with capacities from 20 lbs. (9 kg.) to 1 ton.



Multiple core extrusion with tool-room accuracy

FORDATH Multiple Rotary Core Machine. Any diameter core from 3.175mm to 152mm, accurate to .025mm. *Machine requires only one conveyor for all sizes of core.* Multiple extrusion from dies up to 66mm diameter, producing 10 of the smallest diameter cores simultaneously. Accurately finished dies, provided with venting device. Two sizes: Senior (power-driven) and Junior (either power-driven or hand-operated for the bench).

Save time and cost, improve quality, reduce rejects with

MADE IN ENGLAND

FORDATH MACHINES IN THE FOUNDRY

Used and proved in famous British foundries: Royal Arsenal, Austin Motor Co. Ltd., English Electric Co. Ltd., Ford Motor Co. Ltd., Rolls Royce Ltd., etc., etc.

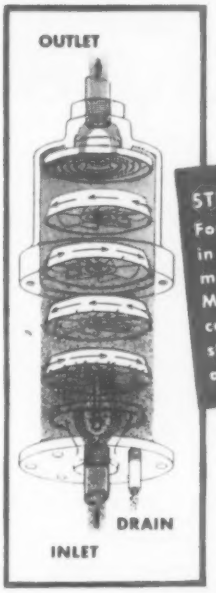
Full information on request from:

THE FORDATH ENGINEERING CO · LTD

Hamblet Works · West Bromwich · England

Cables · Telegrams: "METALLICAL" WEST BROMWICH, ENGLAND

Why does an ARIDIFIER



REMOVE 92% OIL, WATER AND DIRT FROM GAS AND AIR LINES?

STUDY EXPLODED VIEW FOR ANSWER

Four multi blade rotors revolve at high speed in opposite directions under impact of air movement through non-aligned rotor spaces. Moisture, dirt and other foreign matter which collect on rotor blades are thrown out of air stream by centrifugal force to side of housing, and pass into drain.

For paint and lacquer spraying, ceramic, sand blasting, air cleaning, etc. Easily replaces less efficient baffle type devices. Tell us details of your problem when you write for a catalog.

CAPACITY RANGE: AS LOW AS 7 CFM TO 17,000 CFM.

Made By The Manufacturers of Logan Lathes and Shapers.

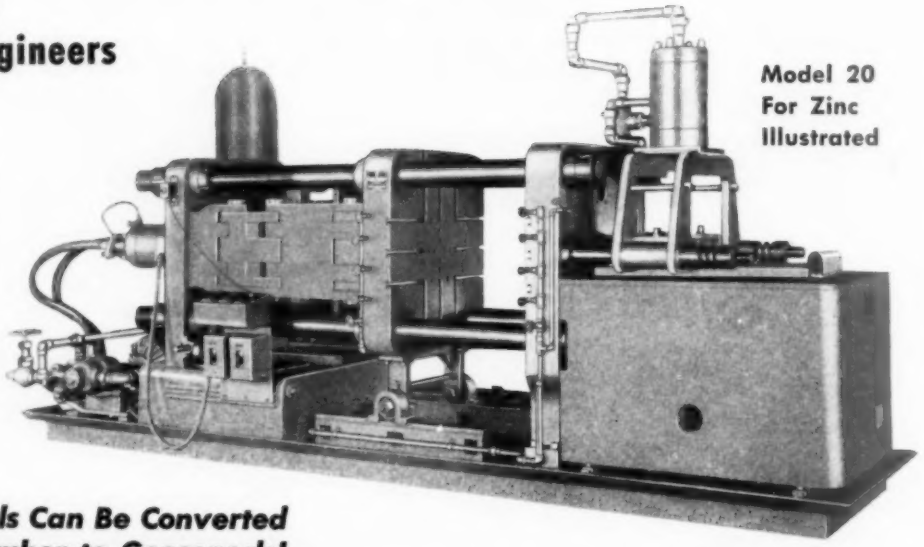
Logan ENGINEERING CO.

4913 W. LAWRENCE AVE., CHICAGO 30, ILL.

. . . Designed for Punishment
CAST-MASTER *Die Casting Machines*

Precision Built by Die Casting Engineers

● Cast-Master Die Casting Machines are designed and built by engineers with years of experience in the Die Casting Industry. Each model has been given months of actual operation under the most severe conditions. You'll find a CAST-MASTER geared for years of trouble-free operation plus high speed production at a minimum cost.



Model 20 For Zinc Illustrated

All Cast-Master Models Can Be Converted From Cold Chamber to Gooseneck!

MILLER•TAYLOR TOOL CO.
5005 EUCLID AVENUE • CLEVELAND 3, OHIO

Send for New Catalog Showing Complete Line of Cast-Master Die-Casting Machines.

MAUGHLIN
PATTERN LETTERS AND MONOGRAMS

A Hammer Blow Secures Letters To Pattern

The Maughlin Pattern Letters are made of hard aluminum alloy to withstand severe usage and have a number of points on the underside so they can be attached permanently to the pattern.

Industries of the United States and Foreign Countries are using Maughlin Pattern Letters With The Points, Some, who formerly cast their own letters of lead, have found it to be much more economical to use the Pattern Letter With The Points.

Our facilities for making special dies for Monograms & Trade Marks are of the finest, enabling us to quote you extremely low prices.

The COST of the Pattern makers time alone applying lead letters to a pattern, EXCEEDS the cost of the Maughlin Pattern Letter.

Large Stock Carried assuring immediate delivery.

THE H. P. MAUGHLIN CO.
953 Ingleside Ave., Columbus, Ohio

Manufacturers of letters and numbers exclusively for over 30 years

CLASSIFIED ADS IN

THE FOUNDRY

BRING RESULTS!

● Do you need a superintendent, foreman, metallurgist, electric furnace man, core room foreman, pattern maker, cupola expert?

● Have you some used equipment which should be turned into cash?

● Are you seeking a job?

Address:
CLASSIFIED ADVERTISING SERVICE
THE FOUNDRY
PENTON BUILDING, CLEVELAND, O.

WITH

DRAVO *Counterflo* HEATERS

You do only HALF the job of foundry ventilating when you exhaust smoke, fumes and airborne dust. Do a 100% job by supplying clean, fresh, tempered replacement air with Dravo *Counterflo* Heaters. These same units will provide ample plant ventilation in summer.

Gas or oil-fired . . . readily converted from one to the other. Stainless steel combustion chamber. Up to 22,000 CFM air-handling capacity per unit. Directs warm air to the working zone without drafts. Easily installed—only power line, fuel pipe and stack required. Floor, wall or ceiling mounting. *Greater employee comfort means greater production.* Write for Bulletin LX-523.

DRAVO CORPORATION
DRAVO BUILDING, PITTSBURGH 22, PA.
Sales Representatives in Principal Cities

DRAVO

Always Available!

AN IDEAL FUEL FOR DRYING MOLDS

● Leading foundries everywhere can depend on Ford Charcoal Briquets for drying molds because of their year 'round availability. Ford Charcoal Briquets give you all these important advantages, too—portable, dry, penetrating heat . . . minimum fines or breakage . . . burn uniformly for a longer time.

Get the favorite foundry fuel for drying molds . . . pre-heating castings . . . as a cover on molten metal.

Order now from your distributor, or write the Ford Motor Company, Sales Department, Iron Mountain, Michigan.

Ford

Charcoal Briquets

The *heat-packed* charcoal

This company* planned to spend $2000.00 to clean out fuel oil sludge–

HOUGHTO-SOLV saved them $1932.50!

How? Instead of a laborious, slow and costly hand cleaning of their fuel oil tanks containing 20,000 gallons of oil-sludge mixture, they poured in half-a drum of HOUGHTO-SOLV, Houghton's powerful sludge solvent.

In a few short days the solvent had taken sludged into solution, saving a ten-cents-per-gallon removal cost and giving them 20,000 gallons of burnable oil. Lines and burners were clean, pumps free from clogging by sludge.

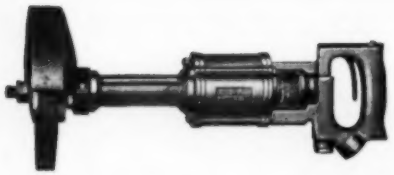
You, too, can get the same results if you'll try HOUGHTO-SOLV for sludge fuel oil systems. Write for new descriptive folder and prices. E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.

**Name on Request*

HOUGHTON'S
HOUGHTO-SOLV
THE FUEL OIL ADDITIVE THAT MAKES SLUDGE BURNABLE

Master Power

HARD CHROMED • PORTABLE PNEUMATIC TOOLS



DO MORE WORK AT LESS COST

because they deliver more power per cubic foot of air consumed, are light in weight for easier maneuverability and they retain their new tool power longer.

ARE PREFERRED BY OPERATORS

because they are lighter in weight, better balanced and designed to reduce shock and be free from vibration.

IF YOUR PROBLEM INCLUDES

chipping, ramming, grinding, buffing, sanding or wire brushing, *write us today for full particulars.*

THE MASTER PNEUMATIC TOOL COMPANY, INC.

ORWELL, OHIO • U. S. A.

SALES • SERVICE • STOCK • COAST TO COAST

DSM

INDUSTRIAL OVENS

PLANT ENGINEERING CLEANING EQUIPMENT

OVER 30 YEARS EXPERIENCE AND SERVICE TO INDUSTRY

Write, Wire or Phone for Prompt Service

DETROIT SHEET METAL WORKS

1306 Dakman Boulevard DETROIT 6 MICHIGAN

Eastern Rep. R. W. RICHARDS CO., RIDGEWOOD, N. J.

ANALYSIS OF CASTING DEFECTS

133 pages, illustrated
Price $4.25 Postpaid

To help foundrymen minimize and eliminate defective castings. Thirty-one basic casting defects are listed and described. Defects are defined simply and completely, illustrated by 101 figures collected from foundries of the United States and Canada.

THE PENTON PUBLISHING COMPANY

Book Department

1213 W. 3rd St., Cleveland 13, Ohio

GREENE ELECTRIC MELTING FURNACES

For gray cast iron, especially for smaller foundries, also holding furnaces for iron and melting furnaces for steel.

GREENE ELECTRIC FURNACE CO.

2702 6th So. Seattle 4, Wash.

HERBERT F. MILLER

CONSULTANT IN MANAGEMENT AND FOUNDRY ENGINEERING.
GRAY IRON, MALLEABLE IRON AND STEEL.

2130 MELROSE STREET
ROCKFORD, ILLINOIS

1 COMBINATION DOES 4 JOBS

- LIGHTS CUPOLAS
- HEATS LADLES
- DRIES MOLDS
- PREHEATS CASTINGS

Oil - Burning, instant lighting, no preheating, adjustable flame size; simple, speedy, economical, safe, versatile. Write for Catalog on this and other compressed air and hand pump burners.

HAUCK
All-Purpose BURNER OUTFIT

No. 2-S-E Outfit; interchangeable burner nozzles and portable burner stand; burns oil with air at 40 p.s.i. or higher.

HAUCK MANUFACTURING CO. 106 Tenth St., Brooklyn 15, N.Y.

BUCKEYE HIGH TEMPERATURE CEMENTS OFFER YOU MORE COST-REDUCING ADVANTAGES

BUCKEYE HIGH TEMPERATURE FURNACE CEMENT

Silicon Carbide Base Cement.
For use in any crucible or non-crucible (open flame) type furnace.
Coarse grain Cement for ramming in furnace and monolithic walls.
General all around cement that works well on cupola spouts, ladles, retorts, etc.
Recommended as wash on fire brick or lining.

No. 91 HIGH TEMPERATURE FURNACE CEMENTS

Neutral Cement—Does not react with molten alloys either ferrous or non-ferrous.
Especially adaptable when laying in fire brick where extremely fine and close joints are required.
Wash over furnace walls, tuyere openings and furnace bottoms.
For emergency repairs on hot or cold surfaces or brick work, has coefficient of expansion as that of fire brick.

SHIPPED DRY in 500 lb. Barrels YOU SAVE!

1 Guaranteed to withstand temperature of 3200°—not affected by waste gases or fuels.
2 A convenient dry compound—add water at the foundry . . . save!
3 High mechanical and compressive strength—withstands extremes of expansion and contraction.
4 Possesses remarkable radiation ability — more heat returned from furnace walls.
5 Reduces heat loss through lining.
6 Extends the life of brick and rammed linings.

THE BUCKEYE PRODUCTS COMPANY

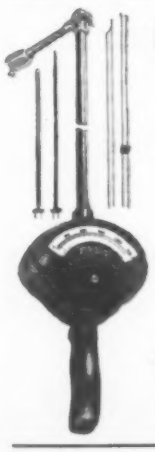
7029 VINE STREET CINCINNATI 16, OHIO

Manufacturers of Core Oil • Parting • Core Compounds • Core Wash • Refractory Cements

Measure Foundry Temperatures Accurately . . . at a glance!

Use the Simplified PYRO Optical Pyrometer

Any operator can quickly determine temperatures of minute spots, fast-moving objects and smallest streams with the simplified PYRO Optical Pyrometer. Completely self-contained—no calibration charts or accessories needed. An accurate, DIRECT-READING instrument that will pay for itself many times over by helping prevent spoilage. Weighs just 3 lbs. Available in 5 ranges (1400° to 7500° F.) *Write for FREE CATALOG #80, today!*



For Non-Ferrous Foundries . . . the PYRO IMMERSION PYROMETER

Helps insure low-cost production of SOUND, UNIFORM Castings. Has shielded steel housing which is shock-proof, dust-proof and moisture-proof—withstands roughest handling. "Protected Type" and "Bare Metal" thermocouples are instantly interchangeable, without adjustment or recalibration. Large 4-inch easy-reading dial. Equipped with exclusive LOCK SWIVEL. Ranges: 0-1500° and 0-2500° F. *Write for FREE Catalog #150*

THE PYROMETER INSTRUMENT CO.
New Plant & Lab.
Bergenfield 6, New Jersey.

No. 4 DAYTON RING VALVE BENCH RAMMER

MORE POWER—MORE SPEED

You'll get more production with these faster, more powerful rammers and at the same time substantially reduce maintenance costs.

The Valve Units will last for years. The Cylinder Bores and Piston Rods are HARD CHROME PLATED which doubles the life of the Rammer. Many of the largest foundries in the country have already adopted them as standard. Made in six sizes to meet every requirement.

Send for Bulletin 300

DAYTON PNEUMATIC TOOL CO.

Manufacturers of Pneumatic Tools Since 1903

DAYTON, OHIO

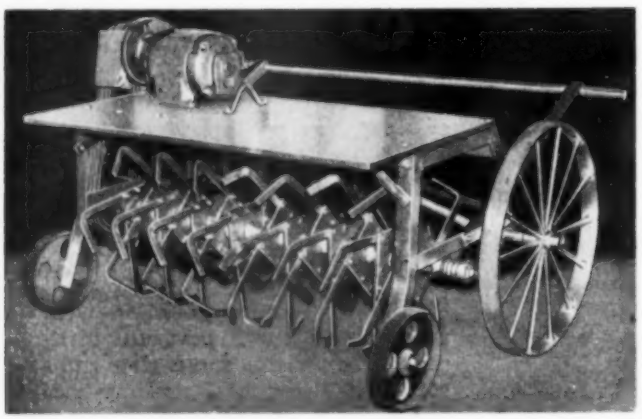
controlled "T" SHOT AND GRIT

"T" is for tough . . . the new process Controlled shot and grit that cleans better and faster, lasts longer and reduces parts and machine wear. That all adds up to profits for you. Not annealed, not heat treated, "T" shot and grit is improved to the point where you can check its better results yourself. Send for a trial order and be convinced on your own work.

Manufactured by NATIONAL METAL ABRASIVE CO., Cleveland, Ohio • WESTERN METAL ABRASIVES CO., Chicago Hts., Illinois

Hickman, Williams & Company
INCORPORATED

CLEVELAND • NEW YORK • INDIANAPOLIS • CHICAGO • PITTSBURGH • CINCINNATI • ST. LOUIS • PHILADELPHIA • DETROIT



A LOWER PRICE
ON S & B SANDCUTTERS

Along with more profit and more volume, the S&B Sandcutter offers a lower price, attractive to foundries of every size. The 26 x 48" cutterhead model is $980, the 26 x 60" cutterhead $1150, both f.o.b. Everett. Write NOW for FREE literature, and details.

S&B SANDCUTTERS

SATHER MANUFACTURING CO., INC.
3330 McDougall Everett, Wash.

EF
GAS, OIL AND ELECTRIC
FURNACES
For all annealing and heat treating requirements
THE ELECTRIC FURNACE CO. • SALEM, OHIO

PRODUCERS CORE SAND CORPORATION
PITS AT MICHIGAN CITY, INDIANA AND SAWYER, MICHIGAN
MICHIGAN CITY, INDIANA

THREE REASONS FOR EXTRA WEAR...

1. SEAMLESS PALM
2. EXTRA HEAVY LEATHER
3. EXTRA LARGE SIZE

Made to foundrymen's specifications and proven by service.

Write for complete Bulletin "F"
RICHMOND GLOVE CORPORATION
RICHMOND, IND.

Here's another advantage of the . . .

Heroult

GANTRY-TYPE

ELECTRIC MELTING FURNACE

High powered transformers and modern control equipment are supplied for rapid melting, maximum flexibility and efficiency.

AMERICAN BRIDGE COMPANY

General Offices: *Frick Building, Pittsburgh, Pa.*

BALTIMORE · BOSTON · CHICAGO · CINCINNATI · CLEVELAND
DENVER · DETROIT · DULUTH · MINNEAPOLIS
NEW YORK · PHILADELPHIA · ST. LOUIS · SAN FRANCISCO

United States Steel Export Company, New York

Write for your free copy of the new Heroult Catalog.

AMERICAN BRIDGE COMPANY · USS · Heroult · FURNACES · UNITED STATES STEEL

UNITED STATES STEEL

What are you doing to correct your SCRAP LOSS?

CROBAUGH LABORATORIES

FOUNDRY CONSULTING and METALLURGICAL SERVICE

SAVES many times its cost

THE FRANK L. CROBAUGH COMPANY

1426 W. 3rd St. Cleveland 13, O. SU-4712

Over 50 years Service

USE COST-CUTTING

Electro SINCE 1919

TERCOD CRUCIBLES *and Electro* **SNAGGING WHEELS**

Write for

BULLETIN CR-147 ON CRUCIBLES AND GRINDING WHEEL MANUAL NO. 645

Electro REFRACTORIES & ALLOYS CORP.

Mfrs. • Kiln Furniture • Refractories • High Temperature Cements

344 DELAWARE AVE. (*High Speed Grinding Wheels*) BUFFALO 2, N. Y.

West Coast Warehouse, Los Angeles, Calif.

SAND PACKS BETTER HERE

UNDER HEAD

Patented **OPEN HEAD** *Radiator Chaplet*

and **HERE** AROUND STEM

Many foundries use this chaplet to avoid failures in core support and consequent casting rejects.

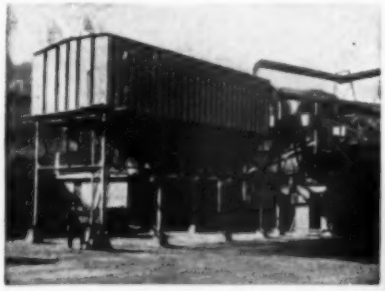
We also make Square Head Radiator Chaplets, Motor, Boiler, Forged Head, Fitted head and Double Head Chaplets. *Write for Bulletin No. 48.*

CLEVELAND CHAPLET & MFG. CO.

West 67th St. & N.Y.C. Ry.
CLEVELAND, O.

CLEVELAND *Chaplets*

Since 1890



28 years experience in designing, building and installing dust-control equipment is at your service. Call for one of our engineers, or write for free booklet . . . "Mastery of the Air".

SAND BLASTING EQUIPMENT

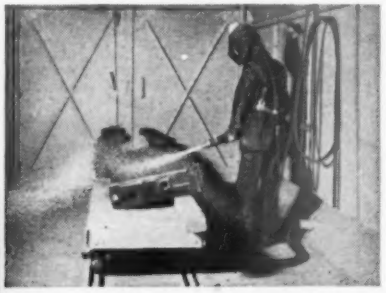
•DUST ARRESTORS•

Reasonable Delivery.

Parsons

ENGINEERING CORP.

2545 EAST 79th ST. CLEVELAND 4, OHIO



Parsons blast rooms, suction cabinets, oscillating blast barrels and accessories, do the job faster . . . better. Custom built to give year after year service, and trouble-free operation.

EMPIRE THAT GOOD **By-Product Coke:**

★ FOR FOUNDRY • METALLURGICAL • CHEMICAL • WATER GAS • DOMESTIC USES ★

PHONE 3-9135

DEBARDELEBEN COAL CORPORATION

Transportation Building
BIRMINGHAM 3, ALA.

DeBardeleben Preparation and Service Give Added Value

FAST • RUGGED

HOLDING • PRESSING • PUNCHING

SIMPLE DESIGN • 8 MODELS

Guaranteed

WRITE FOR CATALOG

VAN PRODUCTS CO.

1302 G. D. BALDWIN BLDG. ERIE, PENNA.

AMERICAN BRITISH CHEMICAL SUPPLIES, Inc.

180 MADISON AVE. NEW YORK 16, N. Y.

A. B. C. FOUNDRATES-FLUXES & COATINGS

for Aluminum—Brass—Bronze & Grey Iron
are made of

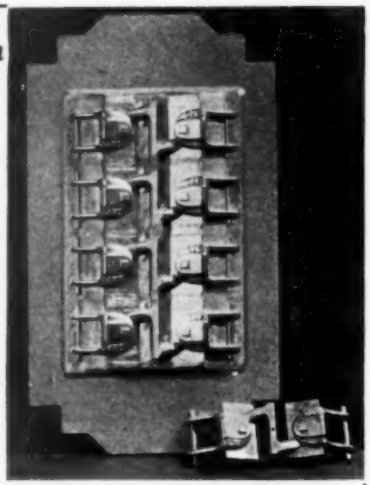
DEPENDABLE COMPOSITION under LABORATORY CONTROL

at our plant Kay Fries Chemicals Co.
West Haverstraw, N. Y.

Where Production is the first Consideration.

Pressure Cast Aluminum Matchplates and Cope and Drag Plates

are the only Satisfactory Answer



Only one master pattern does it! From it we make you single or multiple pattern matchplates, casting them under pressure in plaster molds. Why not find out exactly how much we can save you by this method, or by furnishing cope and drag plates which likewise jump production and lower your costs?

Get our quotations today.

TOLEDO MATCHPLATE COMPANY

534 State Street Toledo 2, Ohio

AFFILIATE: PLASTER PROCESS CASTINGS CO.
6922 Carnegie Ave., Cleveland 3, Ohio

Pressure-Cast MATCHPLATES

COPE and DRAG PLATES

RAPPING PLATES

MANUFACTURED BY

PACIFIC GRAPHITE COMPANY INC.

40TH AND LINDEN STREETS-OAKLAND 8, CALIFORNIA

CHEMISTS and METALLURGISTS

Grey Iron Foundry Consultants
Complete Foundry Testing
Established over 25 years

A. H. PUTNAM COMPANY

Rock Island, Illinois

MODERN BLAST CLEANING AND VENTILATION

By C. A. Reams

Most approved methods of blast cleaning and ventilation are fully covered from the standpoint of modern practices. A valuable text covering the entire field and its allied equipment.

200 pages	**Price**
28 tables	**$4.00**
38 illustrations	**Postpaid**

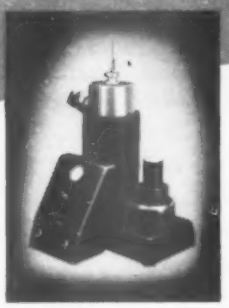
THE PENTON PUBLISHING CO.

Book Department

1213 W. 3rd St., Cleveland 13, Ohio

Improve YOUR CASTINGS with THESE INSTRUMENTS

PERMMETER



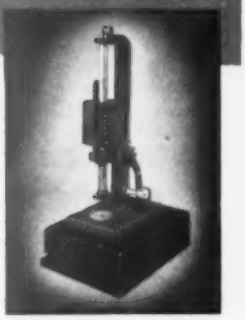
With the Dietert-Detroit Permmeter, you can measure the permeability of foundry sand, core or mold coatings, investment materials, refractories and other materials.

Permeability is read directly through the range .17 to 500 and with a stopwatch up to 2000. The Permmeter does not get out of calibration, and it eliminates the chance of human error.

GREEN CORE IMPACT TESTER

Reduce core makers' complaints on the workability of core mixtures by proper material selection and control. Use Dietert-Detroit Green Core Impact Tester for measuring the resistance of a green core to sagging and cracking, ability to carry overhang and ability to roll-out onto core plate. The results of the test quickly indicate faulty core sand mixtures which can then be corrected to assure greater core accuracy and continuous production of good cores by core makers with minimum skill and care.

SAND RAMMER REACTION BASE



The Sand Rammer Reaction Base assures uniformity of rammed sand specimens regardless of the location of the rammer or the foundation on which it is mounted. Thus, permeability and compression strength readings are more uniform and comparable from day to day than with those made in other laboratories.

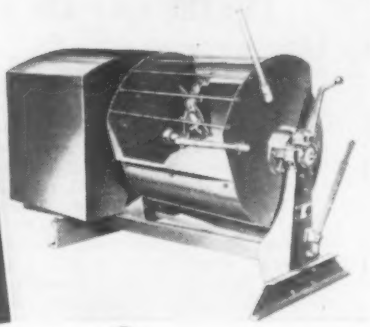
Write to Department 7 for complete specifications

Harry W. DIETERT Company

9330 Roselawn Ave. Detroit 4, Michigan

CONTROL EQUIPMENT • SAND • MOLD • MOISTURE • CARBON • SULFUR

WONDER *Sand* MIXERS



New Mixing Efficiency

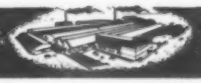
EXCLUSIVE TRIPLE MIXING HOES . . .

Tops in the field! Triple mixing Hoes have adjustable blades . . . easily set for correct clearance. Mixing is *thorough* and "end to end". Advance CMC design makes charging and discharging *easier than ever before!* 6 cu. ft. capacity shown. Write today for full details.

RENEWABLE DRUM LINERS

Easily, replaceable full-hard abrasion resistant alloy steel drum liners are your assurance of lowest upkeep and minimum operating costs.

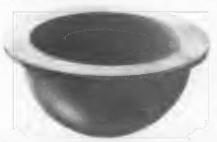
CONSTRUCTION MACHINERY CO'S.



MEECHITE *MELTING POTS*

POURING

MELTING



HOLDING

LONGER SERVICE LIFE, MINIMUM IRON PICK-UP CUT OPERATING COSTS

MEECHITE melting, holding, and pouring pots have been developed for use in ALUMINUM FOUNDRIES, DIE CASTING PLANTS, SMELTING WORKS, and BATTERY PLANTS. They are available in a wide variety of sizes with capacities ranging from 50 to 10,000 pounds.

MEECHITE pots feature longer service life and maximum resistance to swelling and distortion. Minimum iron pick-up assures higher quality castings.

Price and delivery quotations on all types of pots can be furnished by return mail.

WRITE TODAY FOR FREE CATALOG & SPECIFICATION SHEET 101-A

THE MEECH FOUNDRY, INC.

9900-36 MEECH AVE.

CLEVELAND 5, OHIO

10 GRADES OF WASHED, DRIED, SCREENED

SILICA FOUNDRY SANDS

Produced from celebrated Ottawa District St. Peter Sandstone • Rounded Grains

Steel Molding Sand • Core Sand • Blast Sand • Furnace Bottom Sand
Opener Sand • Sand for Non-Ferrous, Aluminum, Magnesium Castings
MICROSIL Ground Silica (5 Standard Grades of Silica Flour)

MICROSIL GROUND SILICA

STANDARD SILICA CORPORATION

209 South LaSalle Street, Chicago • and • Ottawa, Illinois

DISTRIBUTORS IN ALL PRINCIPAL CITIES

BLACKHAWK SILICA SAND

WILLIAMS *Buckets*

"HOOK-ON"
SINGLE LINE
Special Type for
FOUNDRY SERVICE
3/8 to 2 cu. yd. cap.
Send for descriptive bulletin.

THE WELLMAN ENGINEERING CO.
7019 Central Ave. Cleveland, Ohio

built by WELLMAN

MONK

MOLDERS TOOLS

THE COMPLETE LINE
IMMEDIATE DELIVERY
THE MONK TOOL CO. Union St., Geneva, Ill.

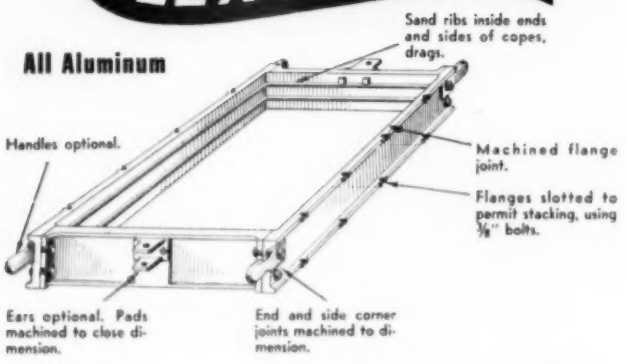
TUMBLING BARRELS

Roller Bearing throughout
Direct Motor Drive with Speed Reducer
V Belt Motor Drive—Tight & Loose Pulley Drive

ROYERSFORD FOUNDRY & MACHINE CO.
BOX F
ROYERSFORD, PA.

FLEXO-FLASK

All Aluminum


Sand ribs inside ends and sides of copes, drags.
Handles optional.
Machined flange joint.
Flanges slotted to permit stacking, using ⅜" bolts.
Ears optional. Pads machined to close dimension.
End and side corner joints machined to dimension.

Save Storage and Shipping Space

The ends and sides of FLEXO-FLASKS are standard in dimension and fully interchangeable. Any piece may be used for either cope, drag, cheek or upset.

Ends increase in length by 2-inch multiples, sides by 4-inch multiples. Height of ends and sides, 3, 4, 6 and 7 inches.

The many combinations of one size side or end with another keeps a greater percentage of your flask investment working.

Disassemble for saving storage space by using common wrench.

Flasks are shipped knocked down, in bundles, saving greatly on shipping space and transportation cost, especially on export shipments. Delivery . . . PROMPT!

C. S. HUMPHREY CO.

249 2nd St., Moline, Illinois

STATEMENT OF OWNERSHIP

Statement of the ownership, management, and circulation required by the Act of Congress of August 24, 1912, as amended by the Acts of March 3, 1933, and July 2, 1946 (39 U. S. C. 233) of The FOUNDRY, published monthly at Cleveland, Ohio, for October 1, 1949. 1. The names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, The Penton Publishing Co., 1213 West Third St., Cleveland 13, O. Editor, Frank G. Steinebach, 1213 West Third St., Cleveland 13, O. Managing editor, William G. Gude, 1213 West Third St., Cleveland 13, O. Business Manager, George O. Hays, 1213 West Third St., Cleveland 13, O. 2. The owner is The Penton Publishing Co., Cleveland, Ohio. Names and addresses of stockholders owning or holding 1 percent or more of total amount of stock: Edwin C. Barringer, Washington, D. C.; Samuel E. Bool, Cleveland, Ohio; Richard M. Bourne, Cleveland, Ohio; County National Bank of Santa Barbara, Santa Barbara, Calif.; J. R. Dawley, Cleveland, Ohio; Ernest C. Dempsey, Richard Inglis & Central National Bank of Cleveland as Trustees under agreement with John A. Penton dated Feb. 16, 1924, Cleveland, Ohio; The Fanner Manufacturing Co., Cleveland, Ohio; Agnes T. Hays, Cleveland, Ohio; George O. Hays, Cleveland, Ohio; Russell C. Jaenke, Cleveland, Ohio; S. H. Jasper, Pittsburgh, Pa.; A. L. Klingeman, Cleveland, Ohio, E. C. Kreutzberg, Washington, D. C.; J. D. Pease, Mount Dora, Fla.; L. E. Penton, Los Angeles, Calif.; E. L. Shaner, Cleveland, Ohio; Charles J. Stark, Cleveland, Ohio; Penelope M. Stark, Cleveland, Ohio; E. L. Werner, Cleveland, Ohio; Grace Whelan, Santa Barbara, Calif. 3. The known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages, or other securities are: None. 4. The two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him. Geo. O. Hays. Sworn to and subscribed before me this 22nd day of September, 1949. (Seal) R. W. Coleman. (My commission expires Dec. 26, 1950.)

WHERE-TO-BUY

The following classified list of products of the advertisers in THE FOUNDRY is conducted for the convenience of our readers in quickly locating sources of foundry equipment and supplies

ABRASIVE (Bricks and Files)

Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., Niagara Falls, N. Y.
Norton Co., Worcester 6, Mass.
Sterling Grinding Wheel Div., Cleveland Quarries Co., Tiffin, O.

ABRASIVE BELTS

Minnesota Mining & Mfg. Co., 900 Fauquier St., St. Paul 6, Minn.

ABRASIVE CLOTH and PAPER

Behr-Manning Div. of Norton Co., Worcester 6, Mass.
Carborundum Co., Niagara Falls, N. Y.
Minnesota Mining & Mfg. Co. 900 Fauquier St., St. Paul 6, Minn.

ABRASIVE CUTOFF MACHINES

Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

ABRASIVE DISCS

Skilsaw, Inc., 5000 N. Elston, Chicago 30, Ill.

ABRASIVE (Metallic)—See SHOT and GRIT

ABRASIVE WHEELS

Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., Niagara Falls, N. Y.
Electro Refractories & Alloys Corp., Vars Bldg., Buffalo 2, N. Y.
Norton Company, Worcester 6, Mass.
Raybestos-Manhattan, Inc., Manhattan Rubber Division, Passaic, N. J.
Sterling Grinding Wheel Div., Cleveland Quarries Co., Tiffin, O.

ACETYLENE (Cylinders and Tanks)

Air Reduction Sales Co., 60 East 42 St., New York 17, N. Y.
Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.

ADHESIVES (Special)

National Starch Products Inc., 270 Madison Ave., New York 16, N.Y.

ADHESIVES (Wood, Metal, Leather)

National Starch Products Inc., 270 Madison Ave., New York 16, N.Y.

AERATORS

Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.
Jeffrey Mfg. Co., Columbus 16, O.
Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co., Newaygo, Mich.

AFTERCOOLERS (Compressed Air)

Jas. A. Murphy & Co., Hamilton, O.

AIR COMPRESSORS

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

AIR COMPRESSORS (Cont'd.)

Campbell-Hausfeld Co., Harrison, O.
Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.
Curtis Pneumatic Machinery Co., 1922 Kienlen Ave., St. Louis, Mo.
Fuller Company, Catasauqua, Pa.
Gardner-Denver Co., Gardner Drive, Quincy, Ill.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Joy Mfg. Co., Sullivan Division, Michigan City, Ind.
Schramm Inc., West Chester, Pa.
Spencer Turbine Co., Hartford, Conn.

AIR CONDITIONING EQUIPMENT

American Air Filter Co., Inc., 266 Central Ave., Louisville 8, Ky.
American Wheelabrator & Equipment Co., Mishawaka, Ind.
Curtis Pneumatic Machinery Co., 1922 Kienlen Ave., St. Louis, Mo.
Kirk & Blum Mfg. Co., Cincinnati 25, O.
Schneible Co., Claude B., 2827—25th St., Detroit 16, Mich.

AIR CONTROL EQUIPMENT

Air-Way Pump & Equipment Co., 1050 N. Kilbourn, Chicago, Ill.
American Air Filter Co., Louisville 8, Ky.
Foxboro Company, Foxboro, Mass.
Kirk & Blum Mfg. Co., Cincinnati 25, O.
Murphy, Jas. A., & Co., Hamilton, O.

AIRLESS BLAST CLEANING EQUIPMENT

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.
Sly Mfg. Co., W. W. 4753 Train Ave., Cleveland 2, O.

AIR LINE LUBRICATORS

Cleco Division of Reed Roller Bit Co., Houston, Tex.

ALLOYS

Ajax Metal Co., 46 Richmond St., Philadelphia 23, Pa.
Federated Metals Div.
American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.
Climax Molybdenum Co., 500 Fifth Ave., New York 18, N. Y.
Globe Iron Co., Jackson, Ohio
International Nickel Co., Inc., 67 Wall St., New York 5, N. Y.
Molybdenum Corporation of America, Pittsburgh 19, Pa.
Niagara Falls Smelting & Refining Div., Continental-United Industries Co., Inc., 2204 Elmwood Ave., Buffalo 17, N. Y.
Ohio Ferro-Alloys Corp., Canton 2, O.

ALLOYS (Ferro)

Electro Metallurgical Div. Union Carbide & Carbon Corp. 30 E. 42nd St., New York 17, N. Y.
Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.
Keokuk Electro Metals Co., Keokuk, Iowa
Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.
Ohio Ferro-Alloys Corp., Canton 2, Ohio
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

ALUMINUM and ALUMINUM ALLOYS

Ajax Metal Co., 46 Richmond St., Philadelphia 23, Pa.
Apex Smelting Co., 2537 West Taylor St., Chicago 12, Ill.
Federated Metals Division, American Smelting and Refining Co., 120 Broadway, New York 5, N.Y.
Niagara Falls Smelting & Refining Div., Continental - United Industries, Co., Inc., 2204 Elmwood Ave., Buffalo 17, N. Y.
Sonken-Galamba Corp., Kansas City 18, Kansas.
Western Metals Co., 3201 So. Kedzie Ave., Chicago 23, Ill.

ALUMINUM INGOTS

Apex Smelting Co., 2537 West Taylor St., Chicago 12, Ill.
Cleveland Electro Metals Co., West 38th St. & NP R. R., Cleveland 13, O.
Niagara Falls Smelting & Refining Div., Continental - United Industries Co., Inc., 2204 Elmwood Ave., Buffalo 17, N. Y.
Western Metals Co., 3201 So. Kedzie Ave, Chicago 23, Ill.

ANNEALING BASKETS

Pressed Steel Co., Wilkes-Barre, Pa.

ANNEALING BOXES

Pressed Steel Co., Wilkes-Barre, Pa.

ANNEALING CORES

Pressed Steel Co., Wilkes-Barre, Pa.

ANNEALING FURNACES (Electric)

Ajax Electrothermic Corp., Trenton, N. J.
General Electric Co., Schenectady, N Y.

ANNEALING POT RAPPERS

New Haven Vibrator Co., 131 Chestnut St., New Haven 7, Conn.

ANNEALING TUBES

Pressed Steel Co., Wilkes-Barre, Pa.

ARGON

Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.
Linde Air Products Co. 30 E. 42nd St., New York 17, N. Y.

ARRESTORS (Dust)

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Kirk & Blum Mfg. Co., Cincinnati 25, Ohio.
Pangborn Corp., Hagerstown, Md.

ASSOCIATIONS

Crucible Manufacturers Association, 90 West St., New York 6, N. Y.

BAND SAWS

Atlantic Saw Mfg. Co., New Haven, Conn.

BANDS (Snap Flask)

Adams Co., Dubuque, Iowa.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

BARS (Steel)

Republic Steel Corp., 3100 E. 45th St., Cleveland 4, Ohio.

BASKETS (Annealing)

Industrial Fabricating, Inc., 817 Hall St., Eaton Rapids, Mich.
Pressed Steel Co., Wilkes-Barre, Pa.

BEARINGS (Anti-Friction, Roller and Ball)

Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Timken Roller Bearing Co., Canton 6, O.

BELTING (Conveyor, Elevator)

Hewitt Rubber Div. Hewitt-Robins Div., Inc., 240 Kinsington Ave., Buffalo 5, N. Y.
Imperial Belting Co., 1800 So. Kilbourn Ave., Chicago 23, Ill.
Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Raybestos-Manhattan Inc., Manhattan Rubber Division, Passaic, N. J.

BELTS (Abrasive)

Minnesota Mining & Mfg. Co. 900 Fauquier St., St. Paul 6, Minn.

BELTS (Power Transmission)

Imperial Belting Co., 1800 So. Kilbourn Ave., Chicago 23, Ill.
Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Raybestos-Manhattan Inc., Manhattan Rubber Division, Passaic, N. J.

BENTONITE

American Colloid Co., 363 W. Superior St., Chicago 10, Ill.
Baroid Sales Division, 830 Duncommun St., Los Angeles 12, Calif.
Eastern Clay Products, Inc., Jackson, O.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Service Co., Birmingham, Ala.

BINS (Storage)

American Bridge Co., Pittsburgh 19, Pa.
Bartlett & Snow, C. O. Co., 6201 Harvard Ave., Cleveland 5, O.
Neff & Fry, Camden, O.

BLACKING (Mold Core)

Bloomsbury Graphite Co., Bloomsbury, N. J.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O
Stevens, Frederic B., Inc., Detroit 16, Mich.
United States Graphite Co., Saginaw, Mich.

BLASTING EQUIPMENT

American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Hydro-Blast Corp., 2550 N. Western Ave., Chicago 47, Ill.
Pangborn Corp., Hagerstown, Md.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.

BLAST METERS

Foxboro Company, Foxboro, Mass.

BLOWERS

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
American Air Filter Co., 266 Central Ave., Louisville 8, Ky.
American Wheelabrator & Equipment Co., Mishawaka, Ind.
Campbell Hausfeld Co., Harrison, O.
Ingersoll-Rand Co., 11 Broadway, New York, N. Y.

BLOWERS (Cont'd.)

Joy Mfg. Co., La-Del Division, New Philadelphia, Ohio.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Roots-Connersville Blower Corp., Connersville, Ind.
Spencer Turbine Co., Hartford, Conn.
Standard Stoker Co., Inc., 1701 Gaskell Ave., Erie, Pa.
Stroman Furnace & Engineering Co., Division of Peterson Oven Co., 9900 Franklin Ave., Franklin Park, Ill.

BOLTS and NUTS

American Bridge Co., Frick Bldg., Pittsburgh 19, Pa.
Republic Steel Corp., 3100 E. 45th St., Cleveland 4, Ohio.

BOND CLAY

American Colloid Co., 363 W. Superior St., Chicago 10, Ill.
Baroid Sales Division, 830 Ducommun St., Los Angeles 12, Calif.
Eastern Clay Products Inc., Jackson, O.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Great Lakes Foundry Sand Co., United Artists Bldg., Detroit 26, Mich.
Ironton Fire Brick Co., Ironton, O.

BOOKS (Technical)

Penton Publishing Co., 1213 West 3rd St., Cleveland 13, O.

BOTTOM PLATES and BOARDS

Adams Co., Dubuque, Iowa.
Black, Sivalls & Bryson, Inc., 720 Delaware, Kansas City 6, Mo.
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Dougherty Lumber Co., 4300 East 65th St., Cleveland 5, O.
Industrial Fabricating, Inc., 817 Hall St., Eaton Rapids, Mich.
Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Truscon Steel Co., Pressed Steel Div., 6100 Truscon Ave., Cleveland, Ohio.

BOWLS and SHANKS

Industrial Equipment Co., Minster, Ohio.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

BOXES (Annealing)

Pressed Steel Co., Wilkes-Barre, Pa.

BOXES (Tote)

Penn Iron Works, Reading, Pa.
Rose Truck & Caster Co., 80 East Jackson Blvd., Chicago, Ill.
Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio.
Sterling Wheelbarow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Truscon Steel Co., Pressed Steel Div., 6100 Truscon Ave., Cleveland, Ohio.

BRAKES (Magnetic)

Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee 4, Wis.

BRICK (Refractory)

Carborundum Co., Perth Amboy, N. J.
A. P. Green Fire Brick Co., Mexico, Missouri.
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Norton Co., Worcester 6, Mass.
Robinson Clay Product Co., 65 West State St., Akron 8, Ohio.
Chas. Taylor Sons Co., P. O. Box 58, Annex Sta., Cincinnati 14, Ohio.

BRIQUETS (Alloy)

Climax Molybdenum Co., 500 Fifth Ave., New York 18, N. Y.
Electro Metallurgical Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Ohio Ferro-Alloys Corp., Canton 2, Ohio

BRIQUETS (Ferro Alloy)

Electro Metallurgical Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Ohio Ferro-Alloys Corp., Canton 2, Ohio

BRIQUETS (Silicon Carbide)

Carborundum Co., Perth Amboy, N. J.

BRIQUETING MACHINERY (Metal)

Milwaukee Foundry Equipment Co., 3328 Pierce St., Milwaukee 4, Wis.

BRUSHES

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.

BUCKETS (Elevating, Clam Shell, Drag Line, Grab, Loader, Dumping)

Blaw-Knox Co., Farmers Bank Bldg., Pittsburgh, Pa.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, O.
Erie Steel Construction Co., Erie, Pa.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.
Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Penn Iron Works, Reading, Pa.
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

BUILDING and ENGINEERING SERVICE

American Bridge Co., Pittsburgh 19, Pa.

BURNERS (Acetylene, Oil, Gas, Powdered Coal, Stoker)

Hauck Mfg. Co., 106 Tenth St., Brooklyn 15, N. Y.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.

BUSHINGS (Blow-plate)

Martin Engineering Co., Kewanee, Ill.

BUSHINGS (Flask-Pin)

Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio.
Smillie & Co., C. M., 1100 Woodward Hgts. Blvd., Ferndale, Mich.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Universal Engineering Co., Frankenmuth, Mich.

CALCIUM BORIDE

Molybdenum Corporation of America, Pittsburgh 19, Pa.

CALCIUM MOLYBDATE

Climax Molybdenum Co., 500 Fifth Ave., New York 18, N. Y.
Molybdenum Corporation of America, Pittsburgh 19, Pa.

CARBON BOOSTER

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

CARS (Core Oven)

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

CARS (Mold Drying)

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

CASTINGS

City Pattern Foundry & Machine Co., 1165 Harper Ave., Detroit 11, Mich.
Wheland Co., Chattanooga, Tenn.

CASTING MACHINES (Centrifugal)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Centrifugal Casting Mach. Co., Tulsa, Okla.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.

CASTING MACHINES (Permanent Mold)

Master Pattern Co., 1315 Main Ave., Cleveland, Ohio.

CASTING SEALER

Metallizing Company of America, 3520 W. Carroll Ave., Chicago 24, Ill.
Tousey Varnish Co., 520 West 25th St., Chicago 16, Ill.

CASTINGS (Permanent Mold)

Master Pattern Co., 1315 Main Ave., Cleveland, Ohio.

CEMENT (Metallic)

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Smooth-On Manufacturing Co., 570 Communipaw Ave., Jersey City 4, N. J.

CEMENT (Refractory)

Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., Perth Amboy, N. J.
A. P. Green Fire Brick Co., Mexico, Missouri.
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Ironton Fire Brick Co., Ironton, O.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Norton Co., Worcester 6, Mass.
Robinson Clay Product Co., 65 West State St., Akron 8, Ohio.

CEREAL BINDERS

Foundry Service Co., Birmingham, Ala.
Chas. A. Krause Milling Co., 404 East State St. Milwaukee, Wis.

CHAIN (Hoist, Conveyor, Drive, Sling, etc.)

Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Cleveland Chain Mfg. Co., Broadway & Henry Sts., Cleveland 5, Ohio.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus, O.
Joy Mfg. Co., Joy Division, Pittsburgh, Pa.
Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Taylor Chain Co., S. G., Hammond, Ind.

CHAIN (Steel Loading)

Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Cleveland Chain Mfg. Co., Broadway & Henry Sts., Cleveland 5, Ohio.
David Round & Sons, Broadway & Henry Sts., Cleveland 5, Ohio.

CHAIN (Welded and Weldless)

Chisholm-Moore Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Cleveland Chain Mfg. Co., Broadway & Henry Sts., Cleveland 5, Ohio.

CHAINS (Sling)

Cleveland Chain Mfg. Co., Broadway & Henry Sts., Cleveland 5, Ohio.

CHAPLETS

Angell Nail & Chaplet Co., 4580 E. 71st St., Cleveland, Ohio.
Cleveland Chaplet & Mfg. Co., 1197 W. 67th St., Cleveland 2, O.
Combined Supply & Equipment Co., Inc., 215 Chandler St., Buffalo 7, N. Y.
Fanner Mfg. Co., Brookside Park, Cleveland 2, Ohio.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O
Foundry Service Co., Birmingham, Ala.
Milwaukee Chaplet & Mfg. Co., 1023 S. 40th St., Milwaukee 4, Wis.
Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio.
Frederic B. Stevens, Inc., Detroit 16, Mich.

CHARCOAL

Tennessee Products & Chemical Corp., American National Bank Bldg., Nashville 3, Tenn.

CHARCOAL (Briquets)

Ford Motor Co., Iron Mountain, Mich.

CHEMICALS

Hercules Powder Co., Wilmington 99, Del.
Mathieson Chemical Corp., Mathieson Bldg., Baltimore 3, Md.

CHEMISTS

Crobaugh Co., Frank L., 1426 West Third St., Cleveland 13, Ohio.

CHILLS

Alloy Metal Abrasive Co., 311 W. Huron St., Ann Arbor, Mich.
Angell Nail & Chaplet Co., 4580 E. 71st St., Cleveland, Ohio
Fanner Mfg. Co., Brookside Park, Cleveland 2, Ohio.
Milwaukee Chaplet & Mfg. Co., 1023 So. 40th St., Milwaukee 4, Wis.
Standard Horse Nail Corp., New Brighton, Pa.

CHILL COATINGS

Acheson Colloids Corp., Port Huron, Mich.

CHILL NAILS

Angell Nail & Chaplet Co., 4580 E. 71st St., Cleveland, Ohio.
Standard Horse Nail Corp., New Brighton, Pa.

CHIPPERS—See PNEUMATIC TOOLS

CHISELS (Chipping)

Arrow Tools, Inc., 1900 S. Kostner, Chicago, Ill.
Cleco Division of Reed Roller Bit Co., Houston, Texas.

CHROMIUM (Briquets)

Electro Metallurgical Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

CLAMPS (Flask)

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
Sterling Wheelbarrow Co., 1700 W. Walker St., Milwaukee 14, Wis.
Truscon Steel Co., Pressed Steel Div., 6100 Truscon Ave., Cleveland, Ohio.

CLAMPS (Permanent Mold)

Master Pattern Co., 1315 Main Ave., Cleveland, Ohio.

CLAY (Bonding)

American Colloid Co., 363 W. Superior St., Chicago 10, Ill.
Carpenter Brothers, Inc., 606 West Wisconsin 3, Mo.
Baroid Sales Division, 830 Ducommun St., Los Angeles 12, Calif.
Eastern Clay Products, Inc., Jackson, O.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Illinois Clay Products Co., Joliet, Ill.
Ironton Fire Brick Co., Ironton, O.

CLAY (Refractory)

Carpenter Brothers, Inc., 606 West Wisconsin 3, Mo.
Eastern Clay Products Inc., Jackson, O.
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Illinois Clay Products Co., Joliet, Ill.
Chas. Taylor Sons Co., P. O. Box 58, Annex Sta., Cincinnati 14, Ohio.

CLAY STORAGE BINS

Neff & Fry, Camden, O.

CLEANING EQUIPMENT (Castings)

American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Hydro-Blast Corp., 2550 N. Western Ave., Chicago 47, Ill.
Pangborn Corp., Hagerstown, Md.
N. Ransohoff, Inc., 16 E. 72nd St., Cincinnati 16, Ohio.

CLUTCHES (Magnetic)

Dings Magnetic Separator Co., 4740 Electric Ave., Milwaukee 7, Wis.
Stearns Magnetic Mfg. Co., 622 S. 28th St., Milwaukee 4, Wis.

COAL STORAGE BINS

Neff & Fry, Camden, O.

COBALT (Radio Active)

Eldorado Mining & Refining Ltd., P. O. Box 379, Ottawa, Ont.

COKE (Foundry)

DeBardeleben Coal Corp., 2201 First Ave., N., Birmingham 3, Ala.
Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.
Pickands, Mather & Co., Cleveland 14, O.
Republic Coal & Coke Co., 8 So. Michigan Ave., Chicago 3, Ill.
Semet-Solvay Div., Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.
Tennessee Products & Chemical Corp., American National Bank Bldg., Nashville 3, Tenn.

COKE (Petroleum)

Republic Coal and Coke Co., 8 S. Michigan Ave., Chicago 3, Ill.

COLLECTORS (Dust)

American Wheelabrator & Equipment Co., Mishawaka, Ind.
American Air Filter Co., 266 Central Ave., Louisville 8, Ky.
Bartlett & Snow, C. O. Co., 6201 Harvard Ave., Cleveland, O.
Kirk & Blum Mfg. Co., Cincinnati 25, O.
Pangborn Corp., Hagerstown, Md.
Parsons Engineering Corp., 2545 E. 79th St., Cleveland 4, O.
Schmieg Industries, 302 Piquette St., Detroit 2, Mich.
Schneible Co., Claude B., 2827-25th St., Detroit 16, Mich.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.

CONCRETE STORAGE BINS

Neff & Fry Co., Camden, O.

CONTROL SYSTEMS (Dust)

American Air Filter Co., 223 Central Ave., Louisville, Ky.

CONTROL SYSTEM (Dust) (Cont'd.)

American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.
Schmieg Industries, 302 Piquette St., Detroit 2, Mich.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.

CONVERTER BLOWERS

Roots-Connersville Blower Corp., Connersville, Ind.

CONVERTERS (Bessemer)

Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

CONVEYOR DESIGN

Frank D. Campbell, 332 So. Michigan Ave., Chicago, Ill.
Giffels & Valet, Inc., Marquette Bldg., Detroit, Mich.

CONVEYORS (Apron)

Logan Co., 580 Cabel, Louisville, Ky.

CONVEYORS (Belt)

Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Chain Belt Co., 1671 W. Bruce St., Milwaukee 4, Wis.
Imperial Belting Co., 1800 So. Kilbourn Ave., Chicago 23, Ill.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
Joy Mfg. Co., Joy Division, Pittsburgh, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Chain)

Chain Belt Co., 1671 W. Bruce St. Milwaukee 4, Wis.
Jeffrey Mfg. Co., 907-99 N. Fourth St. Columbus 16, O.
Joy Mfg. Co., Joy Division, Pittsburgh, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., 104 Tenth St., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Standard Conveyor Co., North St. Paul 9, Minn.
Jervis B. Webb Co., 8951 Alpine, Detroit 4, Mich.

CONVEYORS (Gravity)

Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., 104 Tenth St., Ellwood City, Pa.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Live Roller)

Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Magnetic)

Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee 4, Wis.

CONVEYORS (Monorail)

American Monorail Co., 13104 Athens Ave., Cleveland 7, O.

CONVEYORS (Monorail) (Cont'd.)

Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 E. 283rd St., Wickliffe, O.
Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Mathews Conveyer Co., 104 Tenth St. Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Penn Iron Works, Reading, Pa.

CONVEYORS (Overhead)

Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Mathews Conveyer Co., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Jervis B. Webb Co., 8951 Alpine, Detroit 4, Mich.

CONVEYORS (Pneumatic)

Fuller Company, Catasauqua, Pa.

CONVEYORS (Portable)

Joy Mfg. Co., Joy Division, Pittsburgh, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

CONVEYORS (Portable-Gas Electric)

Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

CONVEYORS (Rubber)

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Vibrating)

Ajax Flexible Coupling Co., Westfield, N. Y.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.
Simplicity Engineering Co., Durand, Mich.
Syntron Company, Homer City, Pa.

COPPER

Federated Metals Div.
American Smelting and Refining Co., 120 Broadway, New York 5, N.Y.

COPPER SHOT

Federated Metals Div.,
American Smelting and Refining Co., 120 Broadway, New York 5, N.Y.
Niagara Falls Smelting & Refining Div., Continental-United Industries Co., Inc., 2204 Elmwood Ave., Buffalo 17, N. Y.

CORE BINDERS

American Cyanamid Co., 30 Rockefeller Plaza, New York, N. Y.
American Gum Products Co., 500 Fifth Ave., New York 18, N. Y.
Bakelite Corp., 300 Madison Ave. New York 17, N. Y.
Cities Service Oil Co., 3200 S. Western Ave., Chicago 8, Ill.
Corn Products Sales Co., 17 Battery Pl., New York 4, N.Y.
Delta Oil Products Co., Milwaukee 9, Wis.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
General Electric Co., Pittsfield, Mass.
Hercules Powder Co., Wilmington 99, Del.
E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Chas. A. Krause Milling Co., 404 E. State St., Milwaukee 1, Wis.
National Starch Products Inc., 270 Madison Ave., New York 16, N.Y.

CORE BINDERS (Cont'd.)

Robeson Process Co., 500 Fifth Ave., New York 18, N. Y.
Superior Flake Graphite Co. 33 So. Clark St., Chicago 3, Ill.
Werner G. Smith Co., 2191 W. 110th St., Cleveland 2, O.
Frederic B. Stevens, Inc., Detroit 16, Mich.
United Oil Mfg. Co., 1429 Walnut St., Erie, Pa.
Velsicol Corp., 330 E. Grand Ave., Chicago 11, Ill.

CORE BLOWER BUSHINGS

Martin Engineering Co., Kewanee, Ill.

CORE BLOWING MACHINES

Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Wm. Demmler & Bros., Kewanee, Ill.
Federal Foundry Supply Co. 4600 E. 71st St., Cleveland 5, O.
Foundry Service Co., Birmingham, Ala.
International Molding Machine Co., LaGrange Park, Ill.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Redford Iron & Equipment Co., 20733 Glendale Ave., Detroit 23, Mich.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

CORE BOXES

Accurate Match Plate Co., 1847 W. Carroll St., Chicago, Ill.
Master Pattern Co., 1315 Main Ave., Cleveland, Ohio.
Plastic Corp. of Chicago, 2444 So. Central Ave., Cicero 50, Ill.

CORE COMPOUND

Bakelite Corp., 300 Madison Ave. New York 17, N. Y.
Cities Service Oil Co., 3200 S. Western Ave., Chicago 8, Ill.
Delta Oil Products Co., Milwaukee 9, Wis.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Fordath Engineering Co. Ltd., West Bromwich, Birmingham, England
Werner G. Smith Co., 2191 W. 110th St., Cleveland 2, O.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Velsicol Corp., 330 E. Grand Ave., Chicago 11, Ill.

CORE DRAWING MACHINES

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Freeman Supply Co., Toledo 5, O.
Newaygo Engineering Co., Newaygo, Mich.

CORE DRIERS (Dielectric)

Allis Chalmers Mfg. Co., Milwaukee 1, Wis.

CORE GRINDERS (Power Operated)

Jeffrey Mfg. Co., Columbus 16, O.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee 4, Wis.

CORE KNOCKOUT MACHINES

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Pangborn Corp., Hagerstown, Md.
Simplicity Engineering Co., Durand, Mich.

CORE MAKING MACHINES

Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
Wm. Demmler & Bros., Kewanee, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Fordath Engineering Co. Ltd., West Bromwich, Birmingham, England
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
International Molding Machine Co., LaGrange Park, Ill.
Milwaukee Foundry Equipment Co., 3228 W. Pierce St., Milwaukee 4, Wis.
Redford Iron & Equipment Co., 20733 Glendale Ave., Detroit 23, Mich.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

CORE OILS

Buckeye Products Co., 7022 Vine St., Cincinnati 16, Ohio.
Cities Service Oil Co., 3200 S. Western Ave., Chicago 8, Ill.
Delta Oil Products Co., Milwaukee 9, Wis.
Fordath Engineering Co. Ltd., West Bromwich, Birmingham, England
Foundry Service Co., Birmingham, Ala.
E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.
Werner G. Smith Co., 2191 W. 110th St., Cleveland 2, O.
Frederic B. Stevens, Inc., Detroit 26, Mich.
United Oil Mfg. Co., 1429 Walnut St., Erie, Pa.
Velsicol Corp., 330 E. Grand Ave., Chicago 11, Ill.

CORE OVENS

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, O.
Despatch Oven Co., Minneapolis 14, Minn.
Detroit Sheet Metal Works, 1300 Oakman Blvd., Detroit, Mich.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, O.
Girdler Corp., Thermex Division, 224 E. Broadway, Louisville 2, Ky.
Kirk & Blum Mfg. Co., Cincinnati 25, O.
Lanly Company, 750 Prospect Ave., Cleveland 15, O.
Ross Engineering Corp., J. O., 350 Madison Ave., New York 17, N.Y.
Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich.

CORE PASTE

Corn Products Sales Co., 17 Battery Pl., New York 4, N. Y.
Delta Oil Products Co., Milwaukee 9, Wis.
Eastern Clay Products Co., Jackson, O.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Service Co., Birmingham, Ala.
Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich.

CORE PLATES (Steel, Asbestos)

Black, Sivalls & Bryson, Inc., 720 Delaware, Kansas City 6, Mo.
Industrial Fabricating, Inc., 817 Hall St., Eaton Rapids, Mich.
Johns-Manville, 22 E. 40th St., New York 16, N. Y.
Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Truscon Steel Co., Pressed Steel Div., 6100 Truscon Ave., Cleveland, Ohio.

CORE ROD STRAIGHTENING and CUTTING MACHINERY

American Wheelabrator & Equipment Co., Mishawaka, Ind.

CORE SAND

Great Lakes Foundry Sand Co., United Artists Bldg., Detroit 26, Mich.
Standard Silica Corp., 209 So. LaSalle St., Chicago 4, Ill.
Weldron Silica Co., 38 So. Dearborn St., Chicago, Ill.

CORE SAND MIXERS

American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Blystone Division, Standard Sand & Machine Co., 549 W. Washington St., Chicago 6, Ill.
Clearfield Machine Co., Clearfield, Pa.
Fordath Engineering Co. Ltd., West Bromwich, Birmingham, England.
Freeman Supply Co., 1152 E. Broadway, Toledo 5, O.
Multiplex Machinery Corp., Elmore, Ohio
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Royer Foundry & Machine Co., Kingston, Pa.

CORE STRIPPERS

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

CORE SPRAYERS

Freeman Supply Co., 1152 Broadway, Toledo 5, O.

CORE TRAYS

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.

CORE TRUCKS

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Kirk & Blum Mfg. Co., Cincinnati 25, O.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

CORE VENTS

Demmler, Wm., & Bros., Kewanee, Ill.
Freeman Supply Co., 1152 E. Broadway, Toledo 5, Ohio.
Foundry Service Co., Birmingham, Ala.
Smillie, C. M. & Co., 1100 Woodward Heights Blvd., Ferndale, Mich.
United Compound Co., Inc., 328 South Park Ave., Buffalo 4, N. Y.

CORE WASH

Bloomsbury Graphite Co., Bloomsbury, N. J.
Carborundum Co., Perth Amboy, N. J.
Cities Service Oil Co., 3200 S. Western Ave., Chicago 8, Ill.
Corn Products Sales Co., 17 Battery Pl., New York City 4.
Delta Oil Products Co., Milwaukee 9, Wis.
Federal Foundry Supply Co. 4600 E. 71st St., Cleveland 5, O.
E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
National Carbon Co., Inc., Carbon Products Div., 30 E. 42nd St., New York 17, N. Y.
Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.
Stevens, Frederic B., Inc., Detroit 26, Mich.

CORE WASH (Cont'd.)

United Oil Mfg. Co., 1429 Walnut St., Erie, Pa.
United States Graphite Co., Saginaw, Mich.

CORE WIRE CUTTERS

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

CORE WIRE STRAIGHTENERS

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

CORES (Annealing)

Pressed Steel Co., Wilkes-Barre, Pa.

COUPLINGS (Air Line)

Cleco Division of Reed Roller Bit Co., Houston, Texas.
C. B. Hunt & Sons Inc., Salem, Ohio
U. S. Air Compressor Co., 5300 Harvard Ave., Cleveland 5, Ohio

COUPLINGS (Flexible)

Ajax Flexible Coupling Co., Westfield, N. Y.

CRANE LUBRICATING SYSTEMS

Blaw-Knox Co., Farmers Bank Bldg., Pittsburgh, Pa.

CRANES (Bucket)

Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Electric Tramrail)

Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.

CRANES (Electric Traveling)

American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div., of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Erie Steel Construction Co., Erie, Pa.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.
Northern Engineering Works, 2615 Atwater, Detroit 7, Mich.
Reading Chain & Block Corp., 2108 Adams St., Reading, Pa.
Shepard-Niles Crane & Hoist Corp., 360 Schuyler Ave., Montour Falls, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Gantry)

Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Modern Equipment Co., Port Washington, Wis.
Northern Engineering Works, 2615 Atwater, Detroit 7, Mich.
Wellman Engineering Co., 7000 Central Ave., Cleveland 4, O.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Hand Traveling)

American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Modern Equipment Co., Port Washington, Wis.
Northern Engineering Works, 2615 Atwater, Detroit 7, Mich.
Reading Chain & Block Corp., 2108 Adams St., Reading, Pa.
Shepard-Niles Crane & Hoist Corp., Montour Falls, N. Y.

CRANE (Hand Traveling) (Cont'd.)

Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Jib)

American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Modern Equipment Co., Port Washington, Wis.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Monorail)

American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp Tonawanda, N. Y.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Modern Equipment Co., Port Washington, Wis.
Northern Engineering Works, 2615 Atwater, Detroit 7, Mich.
Shepard-Niles Crane & Hoist Corp., 360 Schuyler Ave., Montour Falls, N. Y.

CRANES (Self-Propelled)

Hughes-Keenan Co., Mansfield, Ohio
Orton Crane & Shovel Co., 608 So. Dearborn, Chicago, Ill.
Silent Hoist & Crane Co., 835 63rd St., Brooklyn 20, N. Y.

CRANES (Traction or Tractor)

Silent Hoist & Crane Co., 885 63rd St., Brooklyn 20, N. Y.

CRUCIBLES

American Crucible Co., North Haven, Conn.
Electro Refractories & Alloys Corp., Vars Bldg., Buffalo 2, N. Y.
Dixon, Joseph, Crucible Co., Jersey City, N. J.
Lava Crucible Co., Pittsburgh, Pa.
National Crucible Co. Mermaid Lane and Queen Sts., Philadelphia 18, Pa.
Ross-Tacony Crucible Co., Tacony, Philadelphia, Pa.
Vesuvius Crucible Co., Swissvale, Pa.

CRUCIBLE FURNACES

Ajax Electrothermic Corp., Trenton, N. J.
Campbell-Hausfeld Co., Harrison, O.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.

CRUCIBLE LIFTERS

Modern Equipment Co., Port Washington, Wis.

CRUCIBLE POURING DEVICES

Modern Equipment Co., Port Washington, Wis.

CRUSHERS (Core)

Simplicity Engineering Co., Durand, Mich.

CUPOLAS

Modern Equipment Co., Port Washington, Wis.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CUPOLA BLOWERS

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Roots-Connersville Blower Corp., Connersville, Ind.
Spencer Turbine Co., Hartford, Conn.
Standard Stoker Co., Inc., 1701 Gaskell Ave., Erie, Pa.
Whiting Corp., 15607 Lathrop Harvey, Ill.

CUPOLA CHARGING MACHINES

American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.
Modern Equipment Co., Port Washington, Wis.
Shepard-Niles Crane & Hoist Corp., Montour Falls, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CUPOLA CONTROL EQUIPMENT

Edwin S. Carman, Lee Rd. at Mayfield, Cleveland 18, Ohio.
Foxboro Company, Foxboro, Mass.

CUPOLA DUST ARRESTORS

Schneible Co., Claude B., 2827—25th St., Detroit 16, Mich.

CUPOLA LININGS

Carborundum Co., Perth Amboy, N. J.
Cleveland Quarries Co., 1740 E. 12th St., Cleveland 14, O.
A. P. Green Fire Brick Co., Mexico, Missouri
Ironton Fire Brick Co., Ironton, O.
Robinson Clay Product Co., 65 West State St., Akron 8, Ohio.
United States Graphite Co., Saginaw, Mich.

CUPOLA PRESSURE VALVES

Norwalk Valve Co., S. Norwalk, Conn.

CUPOLA SPARK ARRESTORS

Claude B. Schneible Co., 2827 25th St., Detroit 16, Mich.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CUTOFF MACHINES (Abrasive)

Fox Grinders Inc., Oliver Bldg., Pittsburgh, Pa.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

DARK ROOM ACCESSORIES (X-Ray)

Eastman Kodak Co., Rochester, N. Y.

DARK ROOM PROCESSING (Chemical Tanks, etc.)

Eastman Kodak Co., Rochester, N. Y.

DEGASIFIERS

Foundry Services, Inc., 280 Madison Ave., New York 16, N. Y.
Metalloy Corp., Rand Tower, Minneapolis 2, Minn.
Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Niagara Falls Smelting & Refining Div., Continental-United Industries Co., Inc., 2204 Elmwood Ave., Buffalo 17, N. Y.

DEOXIDIZERS

Ajax Metal Co., 46 Richmond St., Philadelphia 23, Pa.
Federated Metals Div. American Smelting and Refining Co., 120 Broadway, New York 5
Cleveland Flux Co., 1026 Main St., Cleveland 13, O.
Metalloy Corp., Rand Tower, Minneapolis 2, Minn.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Niagara Falls Smelting & Refining Div., Continental-United Industries Co., Inc., 2204 Elmwood Ave., Buffalo 17, N. Y.

DEOXIDIZERS (Cont'd.)

Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.

DEOXIDIZERS (Ferrous)

Carborundum Co., Perth Amboy, N. J.

DESULPHURIZERS

Cleveland Flux Co., 1026 Main St., Cleveland 13, O.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Hercules Powder Co., Wilmington 99, Del.
Mathieson Chemical Corp., 60 Mathieson Bldg., Baltimore 3, Md.
Modern Equipment Co., Port Washington, Wis.
Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.
Solvay Sales Division Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

DIE CASTING MACHINES

Cleveland Automatic Machine Co., 4932 Beech St., Cincinnati 12, O.
Hydraulic Press Mfg. Co., Mount Gilead, Ohio.
Kux Machine Co., 3930 W. Harrison St., Chicago 24, Ill.
Lester-Phoenix Inc., 2711 Church St., Cleveland 13, Ohio.
Miller-Taylor Tool Co., 5005 Euclid Ave., Cleveland 3, Ohio

DIES

City Pattern Foundry & Machine Co., 1161 Harper Ave., Detroit 11, Mich.
Lester-Phoenix Inc., 2711 Church St., Cleveland 13, Ohio.

DIRECT FIRED HEATERS

Dravo Corp., Neville Island, Pittsburgh 25, Pa.
Surface Combustion Corp., Toledo 7, Ohio

DOWEL PINS

Standard Horse Nail Corp., New Brighton, Pa.

DRILLS (Pneumatic)

Gardner-Denver Co., Quincy, Ill.
Schramm Inc., West Chester, Pa.

DRIVES (Reciprocating)

Ajax Flexible Coupling Co., Westfield, N. Y.

DRUMS (Magnetic)

Dings Magnetic Separator Co., 4740 Electric Ave., Milwaukee 7, Wis.
Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee 4, Wis.

DUMP HOPPERS

Rose Truck & Caster Co., 80 East Jackson Blvd., Chicago, Ill.
Roura Iron Works, 1405 Woodland Ave., Detroit 11, Mich.

DUMP TRUCKS

Frank G. Hough Co., Libertyville, Ill.

DUST ARRESTING EQUIPMENT

American Air Filter Co., Inc., 266 Central Ave., Louisville 8, Ky.
American Wheelabrator & Equipment Co., Mishawaka, Ind.
Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.
Kirk & Blum Mfg. Co., Cincinnati 25, O.

DUST ARRESTING EQUIPMENT (Cont'd.)

Newcomb-Detroit Co., Inc., 5741 Russell St., Detroit 11, Mich.
Pangborn Corp., Hagerstown, Md.
Parsons Engineering Corp., 2545 E. 79th St., Cleveland 4, O.
Schmieg Industries, 302 Piquette St., Detroit 2, Mich.
Schneible Co., Claude B., 2827-25th St., Detroit 16, Mich.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

DUST COLLECTORS

Pangborn Corp., Hagerstown, Md.
Schmeig Industries, 302 Piquette, Detroit 2, Mich.
Claude B. Schneible Co., 2827 25th St., Detroit 16, Mich.

DUST COLLECTORS (Shake-out)

Newcomb-Detroit Co., Inc., 5741 Russell St., Detroit 11, Mich.
Pangborn Corp., Hagerstown, Md.

DUST CONTROL (Chemical)

Johnson March Corp., 1724 Chestnut St., Philadelphia, Pa.
Pangborn Corp., Hagerstown, Md.

DUST RECOVERY SYSTEMS

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Kirk & Blum Mfg. Co., Cincinnati 25, O.
Pangborn Corp., Hagerstown, Md.
Parsons Engineering Corp., 2545 E. 79th St., Cleveland 4, O.

ELECTRIC FURNACES (see Furnaces, Electric)

ELECTRODES (Graphite and Amorphous)

International Graphite & Electrode Corp., St. Marys, Pa.
National Carbon Co., Inc., Electrode Sales Div., 30 E. 42nd St., New York 17, N. Y.

ELEVATORS

Standard Conveyor Co., North St. Paul 9, Minn.

ELEVATORS (Bucket)

Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Chain Belt Co., 1671 W. Bruce St., Milwaukee 4, Wis.
Jeffrey Mfg. Co., Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co., Newaygo, Mich.
Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.

ELEVATORS (Material Handling)

Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

ELEVATORS (Pneumatic, Material Handling)

Fuller Co., Catasauqua, Pa.

ENGINEERING SERVICE (Foundry)

Frank D. Campbell, 332 So. Michigan Ave., Chicago, Ill.
Edwin S. Carman, Lee Rd. at Mayfield, Cleveland 18, Ohio
Giffels & Vallet, Inc., Marquette Bldg., Detroit, Mich.
Lester B. Knight & Associates, Inc., 600 West Jackson Blvd., Chicago 3, Ill.

ENGINEERING SERVICE (Foundry) (Cont'd.)

Herbert F. Miller, 2130 Melrose St., Rockford, Ill.
A. H. Putnam Co., 1319 2nd Ave., Rock Island, Ill.
Westover Engineers, 424 E. Wells St., Milwaukee 2, Wis.
Wickland Co., A. A., 205 W. Wacker Dr., Chicago 6, Ill.

ENGINEERING SERVICE (Permanent Mold)

Master Pattern Co., 1315 Main Ave., Cleveland, Ohio

EXHAUST SYSTEMS

American Air Filter Co., Inc., Louisville 8, Ky.
American Wheelabrator & Equipment Co., Mishawaka, Ind.
Pangborn Corporation, Hagerstown, Md.
Parsons Engineering Corp., 2545 E. 79th St., Cleveland 4, O.
Propellair Inc., Springfield, O.
Schmeig Industries, 302 Piquette, Detroit 2, Mich.
Schneible Co., Claude B., 2827—25th St., Detroit 16, Mich.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.

FABRICATORS (Metal)

Roura Iron Works, 1405 Woodland Ave., Detroit 11, Mich.

FACINGS

Delta Oil Products Co., Milwaukee 9, Wis.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
National Carbon Co., Inc., Carbon Products Div., 30 E. 42nd St., New York 17, N. Y.
Pacific Graphite Works, 40th & Linden Sts., Oakland 8, Calif.
Stevens Inc., Frederic B., Detroit 16, Mich.
United States Graphite Co., Saginaw, Mich.

FANS (Ventilating, Exhaust, Cooling, etc.)

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Joy Mfg. Co., La Del Division, New Philadelphia, Ohio.
Pangborn Corp., Hagerstown, Md.
Propellair Inc., Springfield, O.

FEEDERS (Rotary)

Fuller Company, Catasauqua, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Newaygo Engineering Co., Newaygo, Mich.

FEEDERS (Sand)

Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

FERROBORON

Electro Metallurgical Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Molybdenum Corp. of America, Pittsburgh 19, Pa.

FERROCHROME

Electro Metallurgical Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Hickman-Williams & Co., Cleveland, O.
Ohio Ferro-Alloys Corp., Canton 2, O.
Vanadium Corp., of America, 420 Lexington Ave., New York, N. Y.

—When writing advertisers, please mention THE FOUNDRY—

FERROCOLUMBIUM

Electro Metallurgical Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

FERROMANGANESE

Electro Metallurgical Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Ohio Ferro-Alloys Corp., Canton 2, O.
Tennessee Products & Chemical Corp., American National Bank Bldg., Nashville 3, Tenn.

FERROMOLYBDENUM

Climax Molybdenum Co., 500 Fifth Ave., New York 18, N. Y.
Molybdenum Corporation of America, Pittsburgh 19, Pa.

FERROPHOSPHOROUS

Tennessee Products & Chemical Corp., American National Bank Bldg., Nashville 3, Tenn.

FERROSILICON

Electro Metallurgical Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Globe Iron Co., Jackson, Ohio
Jackson Iron & Steel Co., Jackson, O.
Keokuk Electro Metals Co., 429 So. 4th St., Keokuk, Iowa.
Miller & Company, 332 S. Michigan Ave., Cnicago 4, Ill.
Ohio Ferro-Alloys Corp., Canton 2, O.
Tennessee Products & Chemical Corp., American National Bank Bldg., Nashville 3, Tenn.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FERROTITANIUM

Electro Metallurgical Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FERROTUNGSTEN

Electro Metallurgical Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Molybdenum Corp. of America, Pittsburgh 19, Pa.

FERROVANADIUM

Electro Metallurgical Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FILM (X-Ray)

Eastman Kodak Co., Rochester, N. Y.

FILTERS (Air)

American Air Filter Co., 266 Central Ave., Louisville 8, Ky.

FILTERS and LUBRICATORS (Air Line)

Logan Engineering Co., 4913 Lawrence Ave., Chicago 30, Ill.

FIRE BRICK

Babcock & Wilcox Co., 85 Liberty St., New York 6, N. Y.
Carborundum Co., Perth Amboy, N. J.
A. P. Green Fire Brick Co., Mexico, Missouri
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Illinois Clay Products Co., Joliet, Ill.

FIRE BRICK (Cont'd.)

Norton Co., Worcester 6, Mass.
Robinson Clay Product Co., 65 West State St., Akron 8, Ohio.
Stevens Inc., Frederic B., Detroit 16, Mich.
Chas. Taylor Sons Co., P.O. Box 58, Annex Sta., Cincinnati 14, Ohio

FIRE CLAY

Eastern Clay Products, Inc., Jackson, O.
A. P. Green Fire Brick Co., Mexico, Missouri
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Illinois Clay Products Co., Joliet, Ill.
Ironton Fire Brick Co., Ironton, O.
Robinson Clay Product Co., 65 West State St., Akron 8, Ohio.
Chas. Taylor Sons Co., P.O. Box 58, Annex Sta., Cincinnati 14, Ohio

FIRE SAND

Carborundum Co., Niagara Falls, N. Y.
Cleveland Quarries Co., 1740 E. 12th St., Cleveland 14, O

FIRESTONE

Cleveland Quarries Co., 1740 E. 12th St., Cleveland 14, O.

FLASK BANDS

Chicago Mfg. & Distributing Co., 1928 W. 16th St., Chicago 9, Ill.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio

FLASK BUSHINGS

Black, Sivalls & Bryson, Inc., 720 Delaware, Kansas City 6, Mo.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio
Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Universal Engineering Co., Frankenmuth, Mich.

FLASK PINS

Black, Sivalls & Bryson, Inc., 720 Delaware, Kansas City 6, Mo.
General Foundry Service Corp., 516 23rd Ave., Oakland 6, Calif.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio
Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Universal Engineering Co., Frankenmuth, Mich.

FLASKS (Aluminum)

Adams Co., Dubuque, Iowa
Foundry Service Co., Birmingham, Ala.
Fremont Flask Co., Fremont, O.
General Foundry Service Corp. 516 23rd Ave., Oakland 6, Calif.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, O.

FLASKS (Dowmetal)

Fremont Flask Co., Fremont, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, O.

FLASK FILLERS

Bartlett & Snow, C. C., Co., 6201 Harvard Ave., Cleveland 5, O.

FLASK FILLERS (Cont'd.)

Beardsley & Piper Co., 2424 No. Cicero, Chicago 39, Ill.
Jeffrey Mfg. Co., Columbus 16, O.

FLASKS (Slip)

Adams Co., Dubuque, Iowa.
Fremont Flask Co., Fremont, O.
Freeman Supply Co., Toledo 5, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, O.
Industrial Fabricating, Inc., 817 Hall St., Eaton Rapids, Mich.

FLASKS (Snap)

Adams Co., Dubuque, Iowa.
Fremont Flask Co., Fremont, O.
General Foundry Service Corp., 516 23rd Ave., Oakland 6, Calif.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio
Stevens, Inc., Frederic B. Detroit 16, Mich.

FLASKS (Steel)

Black, Sivalls & Bryson, Inc., 720 Delaware, Kansas City 6, Mo.
Foundry Service Co., Birmingham, Ala.
Industrial Fabricating, Inc., 817 Hall St., Eaton Rapids, Mich.
Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Truscon Steel Co., Pressed Steel Div., 6100 Truscon Ave., Cleveland, Ohio

FLASK FITTINGS

Adams Co., Dubuque, Iowa
Black, Sivalls & Bryson, Inc., 720 Delaware, Kansas City 6, Mo.
Buckeye Products Co., 7022 Vine St., Cincinnati 16, Ohio
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
General Foundry Service Corp., 516 23rd Ave., Oakland 6, Calif.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio
Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio
Truscon Steel Co., Pressed Steel Div., 6100 Truscon Ave., Cleveland, Ohio

FLASK LIFT MACHINES

Beardsley & Piper Co., 2424 No. Cicero, Chicago 39, Ill.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

FLASK LUMBER

Dougherty Lumber Co., 4300 E. 66th St., Cleveland 5, O.
Rietz Lumber Co., 1800 N. Central Park Ave., Chicago, Ill.

FLASKS (Wood)

Adams Co., Dubuque, Iowa
Chicago Mfg. & Distributing Co., 1928 W. 16th St., Chicago 9, Ill.

FLOORING (Non-Slip)

Norton Co., Worcester 6, Mass.

FLUXES

American-British Chemical Supplies Inc., 180 Madison Ave., New York 16, N. Y.
Apex Smelting Co., 2537 West Taylor St., Chicago 12, Ill.
Cleveland Flux Co., 1026 Main St., Cleveland 13, O.
Foundry Services, Inc., 280 Madison Ave., New York 16, N. Y.
Mathieson Chemical Corp., Mathieson Bldg., Baltimore 3, Md.
National Pigment Co., East York St., Philadelphia, Pa.

FLUXES (Cont'd)

Niagara Falls Smelting & Refining Div., Continental-United Industries Co., Inc., 2204 Elmwood Ave., Buffalo 17, N. Y.
Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.

FLUXES (Soldering, Welding & Tinning)

Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.

FOUNDRY CONSULTANTS

Lester B. Knight & Associates Inc., 600 West Jackson Blvd., Chicago 3, Ill.
A. A. Wickland Co., 205 W. Wacker Dr., Chicago 6, Ill.

FOUNDRY ENGINEERS

Lester B. Knight & Associates Inc., 600 West Jackson Blvd., Chicago 3, Ill.
A. A. Wickland Co., 205 W. Wacker Dr., Chicago 6, Ill.

FOUNDRY LAYOUT & METHODS

Frank D. Campbell, 332 So. Michigan Ave., Chicago, Ill.
Giffels & Vallet, Inc., Marquette Bldg., Detroit, Mich.
Lester B. Knight & Associates, Inc., 600 West Jackson Blvd., Chicago 3, Ill.
A. A. Wickland Co., 205 W. Wacker Dr., Chicago 6, Ill.

FOUNDRY NAILS

Standard Horse Nail Corp., New Brighton, Pa.

FOUNDRY SHOVELS
(See SHOVELS)

FOUNDRY SUPPLY HOUSES

Buckeye Products Co., 7022 Vine St., Cincinnati 16, Ohio
Combined Supply & Equipment Co., Inc., 215 Chandler St., Buffalo 7, N. Y.
Eastern Clay Products, Inc., Jackson, O.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O
Foundry Service Co., Birmingham, Ala.
Freeman Supply Co., 1152 E. Broadway, Toledo 5, O.
Stevens, Inc., Frederic B., Detroit 16, Mich.

FURNACES (Aluminum & Magnesium Billets)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio

FURNACES (Aluminum & Magnesium Forgings)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio

FURNACES (Aluminum Melting)

Ajax Engineering Corp., Trenton, N. J.
Campbell-Hausfeld Co., Harrison, O.
Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.
Surface Combustion Corp., Toledo 7, Ohio

FURNACES (Aluminum Rivet Heating)

Ajax Electric Co., Inc., Philadelphia 23, Pa.

FURNACES (Annealing)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio
Despatch Oven Co., Minneapolis 14, Minn.
Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.
Electric Furnace Co., Salem, Ohio
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Lindberg Engineering Co., Fisher Furnace Div. 2450 West Hubbard, Chicago 12, Ill.

FURNACES (Crucible Melting)

Ajax Electrothermic Corp., Trenton, N. J.
Ajax Metal Co., Philadelphia 23, Pa.
Campbell-Hausfeld Co., 300-320 Moore St., Harrison, O.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Stroman Furnace & Engineering Co., Div. of Peterson Oven Co., 9900 Franklin Ave., Franklin Park, Ill.

FURNACES (Electric Melting)

Ajax Electric Furnace Corp., 46 Richmond St., Philadelphia 23, Pa.
Ajax Electrothermic Corp., Trenton, N. J.
Ajax Engineering Corp., Trenton, N. J.
Ajax Metal Co., Philadelphia 23, Pa.
American Bridge Co., Pittsburgh 19, Pa.
Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.
Greene Electric Furnace Co., 2702 6th So., Seattle 4, Wash.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1125, Pittsburgh, Pa.
Swindell-Dressler Corp., Pittsburgh, Pa.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Gas or Oil Fired)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Campbell-Hausfeld Co., Harrison, O.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Electric Furnace Co., Salem, Ohio.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Lanly Company, 750 Prospect Ave., Cleveland 15, Ohio.
Lindberg Engineering Co., Fisher Furnace Div. 2450 West Hubbard, Chicago 12, Ill.
Stroman Furnace & Engineering Co., Div. of Peterson Oven Co., 9900 Franklin Ave., Franklin Park, Ill.

FURNACES (Gray Iron Melting)

American Bridge Co., Pittsburgh 19, Pa.
Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1125, Pittsburgh, Pa.
Swindell-Dressler Corp., Pittsburgh, Pa.

FURNACES (Heat Treating)

Ajax Electric Co., Inc., Philadelphia 23, Pa.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Electric Furnace Co., Salem, Ohio.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.

FURNACES, HEAT TREATING (Electric)

Ajax Electric Co., Inc., Philadelphia 23, Pa.
Ajax Electrothermic Corp., Trenton, N. J.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

FURNACES (Induction Heating)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

FURNACES (Malleable Annealing)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Electric Furnace Co., Salem, Ohio.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
General Electric Co., Schenectady, N. Y.
Lindberg Engineering Co., Fisher Furnace Div. 2450 West Hubbard, Chicago 12, Ill.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Malleable Melting)

American Bridge Co., Pittsburgh 19, Pa.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1125, Pittsburgh, Pa.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Nonferrous Melting)

Ajax Electrothermic Corp., Trenton, N. J.
Ajax Engineering Corp., Trenton, N. J.
Ajax Metal Co., Philadelphia 23, Pa.
Campbell-Hausfeld Co., Harrison, O.
Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.
Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Stroman Furnace & Engineering Co., Div. of Peterson Oven Co., 9900 Franklin Park, Ill.
Swindell-Dressler Corp., Pittsburgh, Pa.

FURNACES (Powdered Coal)

Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Steel Melting)

Ajax Electrothermic Corp. Trenton, N. J.
American Bridge Co., Pittsburgh 19, Pa.
Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1125, Pittsburgh, Pa.
Swindell-Dressler Corp., Pittsburgh, Pa.

FURNACE BLOWERS

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Campbell-Hausfeld Co., Harrison, O.
Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.
Joy Mfg. Co., La-Del Division, New Philadelphia, Ohio.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Roots-Connersville Blower Corp., Connersville, Ind.

FURNACE LININGS

Campbell-Hausfeld Co., Harrison, O.
Carborundum Co., Perth Amboy, N. J.
A. P. Green Fire Brick Co., Mexico, Missouri.
Ironton Fire Brick Co., Ironton, O.
Lindberg Engineering Co., Fisher furnace Div., 2450 West Hubbard, Chicago 12, Ill.
National Carbon Co. Inc., Carbon Products Div., 30 E. 42nd St., New York 17, N. Y.
Stroman Furnace & Engineering Co., Div. of Peterson Oven Co., 9900 Franklin Ave., Franklin Park, Ill.
United States Graphite Co., Saginaw, Mich.

GAGGERS

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

GAS (Oxygen, Acetylene, Industrial)

Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.
Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.

GAS BURNERS

Fisher Furnace Co., 2543 West Hubbard St., Chicago 12, Ill.

GENERATORS (Acetylene)

Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.

GLOVES (Industrial, Safety)

American Optical Co., Southbridge, Mass.
Richmond Glove Corp., Richmond, Ind.

GOGGLES and EYE PROTECTORS

American Optical Co., Southbridge, Mass.
Chicago Eye Shield Co., 2300 West Warren, Chicago 12, Ill.
Mine Safety Appliances Co., Braddock, Thomas and Meade Sts., Pittsburgh 8, Pa.
Wilson Products Inc., Reading, Pa.

GRAPHITE

Acheson Colloids Corp., Port Huron Mich.
Bloomsbury Graphite Co., Bloomsbury, N. J.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Service Co., Birmingham, Ala.
International Graphite & Electrode Corp., St. Marys, Pa.
National Carbon Co. Inc., Carbon Products Div., 30 E. 42nd St., New York 17.
United States Graphite Co., Saginaw, Mich.

GRINDERS (Electric Portable)

Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.
Rotor Tool Co., 17325 Euclid Ave., Cleveland 12, Ohio.
Skilsaw, Inc., 5000 N. Elston, Chicago 30, Ill.
U. S. Electrical Tool Co., Cincinnati 4, O.

GRINDERS (Pneumatic Portable)

Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.
Cleco Pneumatic Tool Div., Reed Roller Bit Co., Houston, Tex.
Master Pneumatic Tool Co., Inc., Orwell, Ohio.
Rotor Tool Co., 17325 Euclid Ave., Cleveland 12, Ohio.

GRINDERS (Surface, Bench, Disc., Floor)

Fox Grinders, Inc., Oliver Bldg., Pittsburgh 22, Pa.
Skilsaw, Inc., 5000 N. Elston, Chicago 30, Ill.
Standard Electrical Tool Co., 2488 Riverside Ave., Cincinnati 4, Ohio.
U. S. Electrical Tool Co., 2488 River Rd. Cincinnati 4, O.
Vonnegut Moulder Corp., 1815 Madison Ave., Indianapolis 2, Ind.

GRINDERS (Swing Frame)

Fox Grinders, Inc., Oliver Bldg., Pittsburgh 22, Pa.
Vonnegut Moulder Corp., 1815 Madison Ave., Indianapolis 2, Ind.

GRINDING WHEELS—See ABRASIVE WHEELS

GRINDING WHEEL DRESSERS

Carborundum Co., Niagara Falls, N. Y.
Desmond-Stephan Mfg. Co., Urbana, O.

GRINDSTONES

Bay State Abrasive Products Co., Westboro, Mass.
Sterling Grinding Wheel Div., Cleveland Quarries Co., 1740 E. 12th St., Cleveland, O.

GRIT (Abrasive)

Alloy Metal Abrasive Co., Ann Arbor, Mich.
American Steel Abrasives Co., Galion, O.
American Wheelabrator & Equipment Co., Mishawaka, Ind.
Carborundum Co., Niagara Falls, N. Y.
Clayton Sherman Abrasives Co., 3896 Lonyo Rd., Detroit 10, Mich.
Cleveland Metal Abrasive Co., 887 E. 67th St., Cleveland, Ohio.
Globe Steel Abrasive Co., Mansfield, Ohio.
Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.
Metal Blast, Inc., 871 E. 67th St., Cleveland, Ohio.
National Metal Abrasive Co., 3560 Norton Ave., Cleveland 7, O.
Pangborn Corp., Hagerstown, Md.
Pittsburgh Crushed Steel Co., Pittsburgh 1, Pa.

HAMMERS (Chipping)

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.
Cleco Pneumatic Tool Div., Reed Roller Bit Co., Houston, Texas.
Dayton Pneumatic Tool Co., Dayton 1, Ohio.
Joy Mfg. Co., Sullivan Division, Michigan City, Ind.
Master Pneumatic Tool Co., Inc., Orwell, Ohio.
Schramm Inc., West Chester, Pa.

HARDNESS TESTING EQUIPMENT

Detroit Testing Machine Co., 19390 Grinnell Ave., Detroit 13, Mich.
Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
Steel City Testing Machines Inc., 8843 Livernois Ave., Detroit 4, Mich.

—When writing advertisers, please mention THE FOUNDRY—

HEAT CONTROL AND RECORDING DEVICES (Cont'd.)

Foxboro Company, Foxboro, Mass.
Illinois Testing Laboratories, Inc., 418 N. LaSalle St., Chicago 10, Ill.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Marshall Co., L. H., 270 W. Lane, Columbus 1, O.

HEATERS (Gas, Oil, Electric)

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Lanly Co., 750 Prospect Ave., Cleveland 15, Ohio.
Ross Engineering Corp., J. O., 350 Madison Ave., New York 17, N.Y.

HEATERS (High Frequency Electric)

Ajax Electrothermic Corp., Trenton, N. J.

HEATERS (Indirect Fired)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio

HEATERS (Space, Unit, Direct Fired)

Dravo Corp., Neville Island, Pittsburgh 25, Pa.
Surface Combustion Corp., Toledo 7, Ohio

HEATERS (Space, Unit, Oven, Water)

American Wheelabrator & Equip-. ment Co., Mishawaka, Ind.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Surface Combustion Corp., Toledo 7, Ohio

HELMETS (Blasting)

American Wheelabrator & Equipment Co., Mishawaka, Ind.
American Optical Co., Southbridge, Mass.
Mine Safety Appliance Co., Braddock, Thomas & Meade Sts., Pittsburgh 8, Pa.
Pangborn Corp., Hagerstown, Md.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, O.

HELMETS (Welding)

American Optical Co., Southbridge, Mass.

HOISTS (Air)

Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.
Curtis Pneumatic Machinery Co., 1922 Kienlen Ave., St. Louis 20, Mo.
Gardner-Denver Co., Quincy, Ill.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Joy Mfg. Co., Sullivan Division, Michigan City, Ind.

HOISTS (Chain)

Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Reading Chain & Block Corp., 2108 Adams St., Reading, Pa.
David Round & Sons, Broadway & Henry Sts., Cleveland 5, Ohio

HOISTS (Electric)

Chisholm-Moore Hoist Corp and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.

HOISTS (Electric) (Cont'd.)

Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
David Round & Sons, Broadway & Henry Sts., Cleveland 5. Ohio
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.
Joy Mfg. Co., Sullivan Division, Michigan City, Ind.
Modern Equipment Co., Port Washington, Wis.
Northern Engineering Works, 2615 Atwater, Detroit 7, Mich.
Reading Chain & Block Corp., 2108 Adams St., Reading, Pa.
Shepard-Niles Crane & Hoist Corp., Montour Falls, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

HOISTS (Hand)

Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio
David Round & Sons, Broadway & Henry Sts., Cleveland 5, Ohio

HOPPERS (Sand)

Industrial Fabricating, Inc., 817 Hall St., Eaton Rapids, Mich.

HOSE (Air, Blasting, Water, Gas)

Gardner-Denver Co., Quincy, Ill.
Hewitt Rubber Div. Hewitt-Robins Div., Inc., 240 Kinsington Ave., Buffalo 5, N. Y.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Pangborn Corp., Hagerstown, Md.
Raybestos-Manhattan, Inc., Manhattan Rubber Div., Passaic, N. J.
Schramm Inc., West Chester, Pa.

HYDRAULIC CLEANING EQUIPMENT

Hydro-Blast Corp., 2050 N. Western Ave., Chicago 47, Ill.
Pangborn Corp., Hagerstown, Md.
N. Ransohoff, Inc., 16 E. 72nd St., Cincinnati 16, Ohio.

HYDRO FINISHING EQUIPMENT

Pangborn Corp., Hagerstown, Md.

ILLUMINATORS (X-Ray Film)

Eastman Kodak Co., Rochester, N. Y.

IMPREGNATING SYSTEMS

Empire Varnish Co., 2636 E. 76th St., Cleveland 4, O.
Metallizing Company of America, 3520 W. Carroll Ave., Chicago 24, Ill.

INDUSTRIAL ENGINEERING SERVICE

Lester B. Knight & Associates, Inc., 600 West Jackson Blvd., Chicago 3, Ill.
Westover Engineers, 424 E. Wells St., Milwaukee 2, Wis.

INGOT MOLDS

Acme Foundry Co., Detroit 16, Mich.

INGOTS (Nonferrous)

Ajax Metal Co., Philadelphia 23, Pa.
American Smelting and Refining Co., 120 Broadway, New York 5
Apex Smelting Co., 2537 West Taylor St., Chicago 12, Ill.
Cleveland Electro Metals Co., W. 38th St. & NP R.R. Cleveland 13, O.
Federated Metals Div., American Smelting and Ref. Co., New York 5
International Nickel Co., Inc., 67 Wall St., New York City 5
Northwestern Iron & Metal Co., 900 "T" Street, Lincoln, Nebraska

INGOTS (Nonferrous) (Cont'd.)

Sonken-Galamba Corp., Kansas City 18, Kansas
Western Metals Co., 3201 So. Kedzie Ave., Chicago 23, Ill.

INJECTION MOLDING MACHINES

Lester-Phoenix Inc., 2711 Church St., Cleveland 13, Ohio
W. McGeough, Milwaukee 7, Wis.

INOCULANTS

Carborundum Co., Perth Amboy, N. J.

IRON CEMENT

Smooth-On Mfg. Co., 570 Communipaw Ave., Jersey City 4, N. J.

IRON ORE

Pickands, Mather & Co., Cleveland 14, O.

IRON OXIDES

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Delta Oil Products Co., Milwaukee 9, Wis.

JACKETS (Mold)

Adams Co., Dubuque, Iowa
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Fremont Flask Co., Fremont, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio
Industrial Fabricating, Inc., 817 Hall St., Eaton Rapids, Mich.

LABORATORY EQUIPMENT (Chemical)

Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
Laboratory Equipment Corp., St. Joseph, Mich.

LABORATORY EQUIPMENT (Physical)

Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
Laboratory Equipment Corp., St. Joseph, Mich.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Norton Co., Worcester 6, Mass.

LADLES

Foundry Service Co., Birmingham, Ala.
Industrial Equipment Co., Minster, O.
Industrial Fabricating, Inc., 817 Hall St., Eaton Rapids, Mich.
Modern Equipment Co., Port Washington, Wis.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

LADLE LININGS

A. P. Green Fire Brick Co., Mexico, Missouri
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Ironton Fire Brick Co., Ironton, Ohio

LATHE CENTERS

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.

LEAD

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5.

LINSEED OIL

Hercules Powder Co., Wilmington 99, Del.

LOADERS

Clearfield Machine Co., Clearfield, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

LOADERS (Tractor-Mounted)

Frank G. Hough Co., Libertyville, Ill.

LUBRICANTS (Industrial)

Acheson Colloids Corp., Port Huron, Mich.
Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill. New York 26, N. Y.
United States Graphite Co., Saginaw, Mich.

LUMBER (All kinds)

Dougherty Lumber Co., 4300 East 68th St., Cleveland 5, Ohio.

MACHINE KEYS

Standard Horse Nail Corp., New Brighton, Pa.

MAGNESIUM (Ingots)

Apex Smelting Co., 2537 West Taylor St., Chicago 12, Ill.

MAGNET CONTROLLERS

Ohio Electric Mfg. Co., 5906 Maurice Ave., Cleveland, Ohio

MAGNETS

Dings Magnetic Separator Co., 4740 Electric Ave., Milwaukee 7, Wis.
Ohio Electric Mfg. Co., 5906 Maurice Ave., Cleveland, Ohio.
Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee 4, Wis.

MANGANESE (Briquets)

Electro Metallurgical Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

MATCHPLATES

Accurate Match Plate Co., 1847 W. Carroll St., Chicago, Ill.
Central Pattern Co. Quincy, Ill.
Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
City Pattern Foundry & Machine Co., 1161 Harper Ave., Detroit 11, Mich.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Master Pattern Co., 1316 Main Ave., Cleveland, Ohio
Plaster Process Castings Co., 6922 Carnegie Ave., Cleveland 3, O.
Scientific Cast Products Corp., 1388-92 E. 40th St., Cleveland 3, O.

MATERIALS HANDLING EQUIPT.

Frank G. Hough Co., Libertyville, Ill.
Hughes-Keenan Co., Mansfield, Ohio.
Orton Crane & Shovel Co., 608 So. Dearborn, Chicago, Ill.

MATERIALS HANDLING DESIGN

Frank D. Campbell, 332 So. Michigan Ave., Chicago, Ill.

MATERIALS HANDLING (Hoists)

Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.

MECHANICAL ENGINEERS

Frank D. Campbell, 332 So. Michigan Ave., Chicago, Ill.
Giffels & Vallet, Inc., Marquette Bldg., Detroit, Mich.

MELTING POTS

Acme Foundry Co., Detroit 16, Mich.
Meech Foundry, 9906 Meech Ave., Cleveland 5, Ohio

METAL CLEANING EQUIPMENT

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.
N. Ransohoff, Inc., 16 E. 72nd St., Cincinnati 16, Ohio.

METALLIC SPRAYING EQUIPMENT

Metallizing Company of America, 3520 W. Carroll Ave., Chicago 24, Ill.

METALLIZING PROCESS

Metallizing Company of America, 3520 W. Carroll Ave., Chicago 24, Ill.

METALLOGRAPHIC EQUIPMENT

Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.

METALLURGISTS

Crobaugh Co., Frank L., 1426 West Third St., Cleveland 13, Ohio.

METERS (Gas, Air, Water)

Illinois Testing Laboratories, Inc., 418 N. LaSalle St., Chicago 10, Ill.
Roots-Connersville Blower Corp., Connersville, Ind.

MIXERS (Core Wash)

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Multiplex Machinery Corp., Elmore, Ohio

MIXERS (Sand and Clay)

American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Blystone Division, Standard Sand & Machine Co., 549 W. Washington St., Chicago 6, Ill.
Clearfield Machine Co., Clearfield, Pa.
Construction Machinery Co., Waterloo, Iowa.
Fordath Enginering Co. Ltd., West Bromwich, Birmingham, England.
Freeman Supply Co., 1152 Broadway, Toledo 5, O.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Multiplex Machinery Corp., Elmore, Ohio
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Royer Foundry & Machine Co., Kingston, Pa.
Sather Mfg. Co., Everett, Wash.

MODELS (Wood)

Master Pattern Co., 1315 Main Ave., Cleveland, Ohio.

MOLD CONVEYORS

Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Chain Belt Co., 1671 W. Bruce St., Milwaukee 4, Wis.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., Ellwood City, Pa.

MOLD CONVEYOR (Cont'd.)

National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co., Newaygo, Mich.

MOLD DRYERS

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

MOLD OVENS and DRYERS

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, O.
Lanly Company, 750 Prospect Ave., Cleveland 15, O.
Ross Engineering Corp., J. O., 350 Madison Ave., New York 17, N. Y.

MOLD WASH

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
National Carbon Co., Inc., Carbon Products Div., 30 E. 42nd St., New York 17, N. Y.
Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich.
United States Graphite Co., Saginaw, Mich.

MOLDING MACHINES

Adams Co., Dubuque, Iowa.
Beardsley & Piper Co., The 2424 N. Cicero, Chicago 39, Ill.
Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Davenport, Machine & Foundry Co., Davenport, Iowa.
Foundry Service Co., Birmingham, Ala.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
International Molding Machine Co., LaGrange Park, Ill.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee 4, Wis.
Moline Iron Works, Moline, Ill.
Nichols, Wm. H., Co., Richmond Hill, Long Island 18, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
S. P. O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

MOLDING MACHINES (Jolt)

Adams Co., Dubuque, Iowa.
Champion Foundry & Machine Co., 1553 West Madison St., Chicago 7, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
International Molding Machine Co., LaGrange Park, Ill.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee 4, Wis.
Nicholls, Wm. H., Co., Richmond Hill, Long Island 18, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
S. P. O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

MOLDING MACHINES (Rollover)

Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
International Molding Machine Co., LaGrange Park, Ill.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee 4, Wis.
Nicholls, Wm. H., Co., Richmond Hill, Long Island 18, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
S. P. O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

MOLDING MACHINES (Squeeze)

Adams Co., Dubuque, Iowa.
Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
International Molding Machine Co., LaGrange Park, Ill.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee 4, Wis.
Moline Iron Works, Moline, Ill.
Nicholls, Wm. H., Co., Richmond Hill, Long Island 18, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, Ohio.
S. P. O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

MOLDING SANDS

Great Lakes Foundry Sand Co., United Artists Bldg., Detroit 26, Mich.
Standard Silica Corp., 209 So. LaSalle St., Chicago 4, Ill.
Wedron Silica Co., 38 So. Dearborn St., Chicago, Ill.

MOLYBDENUM

Molybdenum Corporation of America, Pittsburgh 19, Pa.

MONOGRAMS & TRADEMARKS

H. P. Maughlin Co., 953 Ingleside Ave., Columbus, Ohio

MONORAIL SYSTEMS

American Monorail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Modern Equipment Co., Port Washington, Wis.

MOTORS (Electric)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Ohio Electric Mfg. Co., 5906 Maurice Ave., Cleveland, Ohio.

NAILS (Chill)

Angell Nail & Chaplet Co., 4580 E. 71st St., Cleveland 5, O.
Republic Steel Corp, 3100 E. 45th St., Cleveland 4, Ohio.
Standard Horse Nail Corp., New Brighton, Pa.

NICKEL

International Nickel Co., Inc., 67 Wall St., New York City 5.

NITROGEN

Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.
Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.

NOZZLES (Blasting)

Alloy Metal Abrasives Co., 311 W. Huron St., Ann Arbor, Mich.
American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Davenport Machine & Foundry Co., Davenport, Iowa.
Federal Foundry Supply Co., 4600 E. 7st St., Cleveland 5, O.
Norton Co., Worcester 6, Mass.
Pangborn Corp., Hagerstown, Md.
W. W. Sly, Mfg. Co., 4753 Train Ave., Cleveland 2, O.

OIL BURNERS

Hauck Manufacturing Co., 106 Tenth St., Brooklyn 15, N. Y.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Stroman Furnace & Engineering Co., Div. of Peterson Oven Co., 9900 Franklin Ave., Franklin Park, Ill.

OVENS (Annealing and Heat Treating)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Electric Furnace Co., Salem, Ohio.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Lanly Company, 750 Prospect Ave., Cleveland 15, O.
Lindberg Engineering Co., Fisher Furnaces Div., 2450 West Hubbard, Chicago 12, Ill.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

OVENS (Core) (See CORE OVENS)

OVENS (Enameling, Japanning)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Detroit Sheet Metal Works, 1300 Oakman Blvd., Detroit, Mich.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Lanly Co., 750 Prospect Ave., Cleveland 15, Ohio.

OVENS (Mold)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Detroit Sheet Metal Works, 1300 Oakman Blvd., Detroit, Mich.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Lanly Co., 750 Prospect Ave., Cleveland 15, Ohio.

OXYGEN

Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.
Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.

PARTING COMPOUNDS

Buckeye Products Co., 7022 Vine St., Cincinnati 16, Ohio.
Delta Oil Products Co., Milwaukee 9, Wis.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.
Frederic B. Stevens, Inc., Detroit 16, Mich.

PARTING COMPOUNDS (Cont'd.)

E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Tamms Industries Inc., 228 N. LaSalle St., Chicago 1, Ill.

PATTERN ADHESIVES

National Starch Products Inc., 270 Madison Ave., New York 16, N.Y.

PATTERN COATINGS

American Lacquer Solvents Co., Phoenixville, Pa.

PATTERN COMPOUND

Tamms Industries Inc., 228 N. LaSalle St., Chicago 1, Ill.

PATTERN LETTERS

Freeman Supply Co., Toledo 5, O.
H. P. Maughlin Co., 953 Ingleside Ave., Columbus, Ohio

PATTERN LUMBER

Dougherty Lumber Co., Cleveland 5, O.
Freeman Supply Co., Toledo 5, O.
Rietz Lumber Co., 1800 N. Central Park Ave., Chicago, Ill.

PATTERN MATERIAL (Plastic)

G. G. Schroeder & Co., 1416 South Penn Square, Philadelphia 2, Pa.

PATTERN PLATES

Accurate Match Plate Co., 1847 W. Caroll St., Chicago, Ill.
Buffalo Pattern Works, 830 Hertel Ave., Buffalo, N. Y.
Central Pattern Co., Quincy, Ill.
City Pattern Foundry & Machine Co., 1161 Harper Ave., Detroit 11, Mich.
Foundry Service Co., Birmingham, Ala.
Freeman Supply Co., Toledo 5, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Plaster Process Castings Co., 6922 Carnegie Ave., Cleveland 3.
Scientific Cast Products Corp., 1388-92 E. 40th St., Cleveland 3, O.

PATTERN PLATE STOCK

Freeman Supply Co., 1152 Broadway, Toledo 5, O.

PATTERN SHOP EQUIPMENT

DoAll Company, Des Plaines, Ill.
Freeman Supply Co., 1152 East Broadway, Toledo 5, Ohio.
Oliver Machinery Company, Grand Rapids 2, Mich.
Skilsaw, Inc., 5000 N. Elston, Chicago 30, Ill.

PATTERN SUPPLY HOUSES

Freeman Suppy Co., 1152 East Broadway, Toledo 5, Ohio.

PATTERNS

Industrial Pattern Works, 2621 Belmont Ave., Chicago 18, Ill.

PATTERNS (PLASTIC)

Central Pattern Co., Quincy, Ill.
Plastic Corp. of Chicago, 2444 So. Central Ave., Cicero 50, Ill.

PATTERNS (Wood, Metal)

Accurate Match Plate Co., 1847 W. Carroll St., Chicago, Ill.
Buffalo Pattern Works, 830 Hertel Ave., Buffalo, N. Y.
Central Pattern Co., Quincy, Ill.
Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
City Pattern Foundry & Machine Co., 1161 Harper Ave., Detroit 11, Mich.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Master Pattern Co., 1315 Main Ave., Cleveland, Ohio.
S. P. O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.
Wellman Bronze & Aluminum Co., 2525 E. 93rd St., Cleveland 4, O.

PERMANENT MOLD COATINGS

Acheson Colloids Corp., Port Huron, Mich.

PERMANENT MOLDS

Master Pattern Co., 1315 Main Ave., Cleveland, Ohio.

PHOTOGRAPHIC EQUIPMENT

Eastman Kodak Co., Rochester, N. Y.

PHOTOGRAPHY (Industrial)

Eastman Kodak Co., Rochester, N. Y.

PIG IRON

Globe Iron Co., Jackson, Ohio.
Jackson Iron & Steel Co., Jackson, Ohio.
Keokuk Electro Metals Co., 429 So. 4th St., Keokuk, Iowa.
Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.
Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.
Pickands, Mather & Co., Cleveland 14, O.
Republic Steel Corp., 3100 E. 45th St., Cleveland 4, Ohio.
Tennessee Products & Chemical Corp., American National Bank Bldg., Nashville 3, Tenn.
Woodward Iron Co., Woodward, Ala.

PIG IRON (Silvery)

Globe Iron Co., Jackson, Ohio.
Jackson Iron & Steel Co., Jackson, O.
Keokuk Electro Metals Co., 429 So. 4th St., Keokuk, Iowa.
Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.

PINS (Flask)

Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Shanafelt Mfg. Co., 3623 Winfield Way, N.E., Canton 5, Ohio.
Sterling Wheelbarow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Truscon Steel Co., Pressed Steel Div., 6100 Truscon Ave., Cleveland, Ohio.
Universal Engineering Co., Franknenmuth, Mich.

PISTON RINGS (for Molding Machines, Compressors, etc.)

Nicholls, Wm. H., Co., Richmond Hill, Long Island 18, N. Y.

PLANT ENGINEERING SERVICE

Giffels & Vallet, Inc., Marquette Bldg., Detroit, Mich.

PLANT ENGINEERING SERVICE (Cont'd.)

Lester B. Knight & Associates, Inc., 600 West Jackson Blvd., Chicago 3, Ill.

PLATES (Bottom)

Adams Co., Dubuque, Iowa.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

PLATES (Core Drying)

Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Johns-Manville, 22 East 40th St., New York City 16.

PLATING TEMPERATURE CONTROLS

Foxboro Company, Foxboro, Mass.

PLUMBAGO

Bloomsbury Graphite Co., Bloomsbury, N. J.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Service Co., Birmingham, Ala.
Frederic B. Stevens, Inc., Detroit 16, Mich.
United States Graphite Co., Saginaw, Mich.

PNEUMATIC TOOLS

Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.
Cleco Pneumatic Tool Div., Reed Roller Bit Co., Houston, Texas.
Dayton Pneumatic Tool Co., Dayton 1, Ohio.
Gardner-Denver Co., Quincy, Ill.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Joy Mfg. Co., Sullivan Division, Michigan City, Ind.
Master Pneumatic Tool Co., Inc., Orwell, Ohio.
Rotor Tool Co., 17325 Euclid Ave., Cleveland 12, Ohio.
Schramm Inc., West Chester, Pa.

POURING DEVICES

Industrial Equipment Co., Minster, Ohio.
Modern Equipment Co., Port Washington, Wis.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

PRESSER BOARDS

Adams Co., Dubuque, Iowa.
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.

PRESSES (Hydraulic)

Hydraulic Press Mfg. Co., Mount Gilead, Ohio.

PRESSURE CASTING SEALER

Empire Varnish Co., 2636 E. 76th St., Cleveland 4, O.

PRESSURE RECORDERS

Foxboro Company, Foxboro, Mass.

PULLEYS (Magnetic)

Dings Magnetic Separator Co., 4740 Electric Ave., Milwaukee 7, Wis.
Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee 4, Wis.

PUMPS

Construction Machinery Co., Waterloo, Iowa.
Gardner-Denver Co., Quincy, Ill.

PUMPS (Dry, Vacuum)

Allis Chalmers Mfg. Co., Milwaukee 1, Wis.
Fuller Company, Catasauqua, Pa.
Roots-Connersville Blower Corp., Connersville, Ind.

PURIFIERS

Cleveland Flux Co., 1026 Main St., Cleveland 13, O.

PUSH-OFF MACHINES

Beardsley & Piper Co., 2424 N. Cicero, Chicago 39, Ill.
Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
International Molding Machine Co., LaGrange Park, Ill.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee 4, Wis.

PUTTY (Foundry)

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

PYROMETERS

Foxboro Company, Foxboro, Mass.
Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
Illinois Testing Laboratories, Inc., 418 N. LaSalle St., Chicago 10, Ill.
Marshall Co., L. H., 270 W. Lane, Columbus 1, O.
Pyrometer Instrument Co., Bergenfield, N. J.
Tamms Industries Inc., 228 N. LaSalle St., Chicago 1, Ill.

PYROMETERS (Immersion)

Pyrometer Instrument Co., Bergenfield, N. J.

PYROMETERS (Optical)

Pyrometer Instrument Co., Bergenfield, N. J.

RACKS (Core Oven)

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

RADIOGRAPHY (Industrial)

Eastman Kodak Co., Rochester, N. Y.
Eldorado Mining & Refining Ltd., P.O. Box 379, Ottawa, Ont.
Radium Chemical Co., Inc., 570 Lexington Ave., New York 22, N. Y.

RADIUM

Eldorado Mining & Refining Ltd., P.O. Box 379, Ottawa, Ont.
Radium Chemical Co., Inc., 570 Lexington Ave., New York 22, N. Y.

REFRACTORIES

Babcock & Wilcox Co., 85 Liberty St., New York 6, N. Y.
Carborundum Co., Niagara Falls, N. Y.
Carborundum Co., Perth Amboy, N. J.
Cleveland Quarries Co., 1740 E. 12th St., Cleveland 14, O.
Eastern Clay Products, Inc. Jackson, O.
Electro Refractories & Alloys Corp., Vars Bldg., Buffalo 2, N. Y.
A. P. Green Fire Brick Co., Mexico, Missouri
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Ironton Fire Brick Co., Ironton, O.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.

—When writing advertisers, please mention THE FOUNDRY—

REFRACTORIES (Cont'd.)

Norton Co., Worcester 6, Mass.
Robinson Clay Product Co., 65 West State St., Akron 8, Ohio.
Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich.
Chas. Taylor Sons Co., P.O. Box 58, Annex Sta., Cincinnati 14, Ohio
United States Graphite Co., Saginaw, Mich.

RESPIRATORS

Chicago Eye Shield Co., 2300 West Warren, Chicago 12, Ill.
Mine Safety Appliances Co., Braddock, Thomas and Meade Sts., Pittsburgh 8, Pa.
Wilson Products Inc., Reading, Pa.

RIDDLES

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich.

RIDDLES (Electric)

Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Supplies & Mfg. Co., 2221 Orchard St., Chicago 14, Ill.
Great Western Mfg. Co., Leavenworth, Kans.

RIDDLES (Hand)

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

ROD DIP

Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.

ROD STRAIGHTENERS

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

RODS (Steel)

Republic Steel Corp., 3100 E. 45th St., Cleveland 4, Ohio

ROLLER-HEARTH FURNACES (Electric Annealing)

General Electric Co., Schenectady, N Y.

RUBBER LINING MATERIAL (Abrasive Resisting)

Pangborn Corp., Hagerstown, Md.

SAFETY CLOTHING

American Optical Co., Southbridge, Mass.
Chicago Eye Shield Co., 2300 West Warren, Chicago 12, Ill.
Mine Safety Appliances Co., Braddock, Thomas and Meade Sts., Pittsburgh 8, Pa.
Pangborn Corp., Hagerstown, Md.

SALT and SALT TABLETS

Mine Safety Appliances Co., Braddock, Thomas and Meade Sts., Pittsburgh 8, Pa.

SAND ARRESTER TUBES

Martin Engineering Co., Kewanee, Ill.

SAND (Core, Molding, Blasting)

American Silica Sand Co., Ottawa, Ill.
Carpenter Brothers, Inc., 606 West Wisconsin, Milwaukee 3, Wis.
Great Lakes Foundry Sand Co., United Artists Bldg., Detroit 26, Mich.

SAND (Core, Molding, Blasting) (Cont'd.)

Pangborn Corp., Hagerstown, Md.
Producers Core Sand Corp., Michigan City, Ind.
Standard Silica Corp., 209 So. LaSalle St., Chicago 4, Ill.
Wedron Silica Co., 38 So. Dearborn St., Chicago, Ill.

SAND BLAST BARRELS

American Wheelabrator & Equipment Co., 505 S. Brykit St., Mishawaka, Ind.
Hydro-Blast Corp., 2550 N. Western Ave., Chicago 47, Ill.
Pangborn Corp., Hagerstown, Md.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.
Sly Mfg. Co., W. W. 4753 Train Ave., Cleveland 2, O.

SAND BLAST CABINETS

American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.

SAND BLAST EQUIPMENT

American Air Filter Co., 266 Central Ave., Louisville 8, Ky.
American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Hydro-Blast Corp., 2550 N. Western Ave., Chicago 47, Ill.
Pangborn Corp., Hagerstown, Md.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.

SAND BLAST NOZZLES

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Norton Company, Worcester 6, Mass.
Pangborn Corp., Hagerstown, Md.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.

SAND BLAST ROOMS

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Hydro-Blast Corp., 2550 N. Western Ave., Chicago 47, Ill.
Pangborn Corp., Hagerstown, Md.
Sly Mfg. Co., W. W. 4753 Train Ave., Cleveland 2, O.

SAND BLAST TABLES

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.

SAND BLAST CONDITIONERS

Beardsley & Piper Co., 2424 No. Cicero, Chicago 39, Ill.

SAND CONDITIONING (Chemical)

Johnson March Corp., 1724 Chestnut St., Philadelphia, Pa.

SAND CONTROL & TESTING EQUIPMENT

Beardsley & Piper Co., 2424 No. Cicero, Chicago 39, Ill.
Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

SAND CONVEYING and HANDLING EQUIPMENT

American Air Filter Co., Louisville 8, Ky.
Ajax Flexible Coupling Co., Westfield, N. Y.
C. O. Bartlett & Snow Co., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Chain Belt Co., 1671 W. Bruce St., Milwaukee 4, Wis.
Clearfield Machine Co., Clearfield, Pa.

SAND CONVEYING and HANDLING EQUIPMENT (Cont'd)

Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio
Frank G. Hough Co., Libertyville, Ill.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
Joy Mfg. Co., Joy Division, Pittsburgh, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co., Newaygo, Mich.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Penn Iron Works, Reading, Pa.
Royer Foundry & Machine Co., Kingston, Pa.

SAND CONVEYING and HANDLING EQUIPMENT (Pneumatic)

Fuller Company, Catasauqua, Pa.
Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.

SAND COOLING SYSTEMS

Newaygo Engineering Co., Newaygo, Mich.

SAND DRYERS

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, Ohio.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Nichols Engineering & Research Corp., 70 Pine St., New York 5, N. Y.

SANDERS (Pneumatic)

Cleco Division of Reed Roller Bit Co., Houston, Texas.

SANDERS (Tapered-Spindles)

Wellman Products Co., 1444 E. 49th St., Cleveland 3, O.

SANDING MACHINERY (Disc, Spindle, Belt, etc.)

Freeman Supply Co., 1152 E. Broadway, Toledo 5, Ohio.
Oliver Machinery Company, Grand Rapids 2, Mich.

SAND MEASURING and WEIGHING DEVICES

Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

SAND MIXERS

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Beardsley & Piper Co., The, 2424 N. Cicero, Chicago 39, Ill.
Blystone Division, Standard Sand & Machine Co., 549 W. Washington Blvd., Chicago 6, Ill.
Clearfield Machine Co., Clearfield, Pa.
Construction Machinery Corp., Waterloo, Iowa.
Freeman Supply Co., 1152 E. Broadway, Toledo 5, Ohio.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Multiplex Machinery Corp., Elmore, Ohio
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Royer Foundry & Machine Co., Kingston, Pa.

SAND PREPARATION EQUIPMENT

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
American Wheelabrator & Equipment Co., Mishawaka, Ind.
Ajax Flexible Coupling Co., Westfield, N. Y.
Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.

SAND PREPARATION EQUIPMENT (Cont'd.)

Beardsley & Piper Co., The, 2424 N. Cicero, Chicago 39, Ill.
Clearfield Machine Co., Clearfield, Pa.
Fordath Engineering Co. Ltd., West Bromwich, Birmingham, England.
Hydro-Blast Corp., 2550 N. Western Ave., Chicago 47, Ill.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
Moulders Friend, Dallas City, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Royer Foundry & Machine Co., Kingston, Pa.
Sather Mfg. Co., Everett, Wash.
Simplicity Engineering Co., Durand, Mich.

SAND RAMMERS

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.
Cleco Pneumatic Tool Div., Reed Roller Bit Co., Houston, Texas.
Dayton Pneumatic Tool Co., Dayton 1, O.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
Mastern Pneumatic Tool Co., Inc., Orwell, Ohio.
Rotor Tool Co., 17325 Euclid Ave., Cleveland 12, Ohio.

SAND RECLAIMERS

Hydro-Blast Corp., 2550 N. Western Ave., Chicago 47, Ill.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Nichols Engineering & Research Corp., 70 Pine St., New York 5, N. Y.
Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee 4, Wis.

SAND SIFTING and SCREENING MACHINERY

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
American Air Filter Co., Louisville 8, Ky.
Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, Ohio.
Beardsley & Piper Co., The, 2424 N. Cicero, Chicago 39, Ill.
Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Supplies & Mfg. Co., 2221 Orchard St., Chicago 14, Ill.
Great Western Mfg. Co., Leavenworth, Kansas.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Royer Foundry & Machine Co., Kingston, Pa.
Simplicity Engineering Co., Durand, Mich.
Pangborn Corp., Hagerstown, Md.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

SAND STORAGE BINS & GATES

Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, Ohio.
Beardsley & Piper Co., The, 242 No. Cicero, Chicago 39, Ill.
Jeffrey Mfg. Co., Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Neff & Fry Co., Camden, O.

SANDING MACHINERY (Electric Portable)

Skilsaw, Inc., 5000 N. Elston, Chicago 30, Ill.

SAWS (Band, Metal, Wood)

Atlantic Saw Mfg. Co., New Haven, Conn.
DoAll Company, Des Plaines, Ill.
Oliver Machinery Company, Grand Rapids 2, Mich.

SAWS (Cold Metal)

DoAll Company, Des Plaines, Ill.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

SAWS (Electric Portable)

Skilsaw, Inc., 5000 N. Elston, Chicago 30, Ill.

SCALING HAMMERS

Joy Mfg. Co., Sullivan Division, Michigan City, Ind.
Rotor Tool Co., 17325 Euclid Ave., Cleveland 12, Ohio.
Schramm, Inc., West Chester, Pa.

SCREENS (Shake-Out)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, Ohio.
Beardsley & Piper Co., 2424 N. Cicero, Chicago 39, Ill.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Simplicity Engineering Co., Durand, Mich.

SCREENS (Vibrating)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Ajax Flexible Coupling Co., Westfield, N. Y.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.
Simplicity Engineering Co., Durand, Mich.

SEA COAL

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Frederic B. Stevens, Inc., Detroit 16, Mich.

SEPARATORS (Abrasive)

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.

SEPARATORS (Air, Moisture, Oil)

American Air Filter Co., Louisville 8, Ky.
American Wheelabrator & Equipment Co., Mishawaka, Ind
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Logan Engineering Co., 4913 Lawrence Ave., Chicago 30, Ill.
Jas. A. Murphy & Co., Hamilton, O.
Pangborn Corp., Hagerstown, Md.

SEPARATORS (Magnetic)

Beardsley & Piper Co., 2424 No. Cicero, Chicago 39, Ill.
Dings Magnetic Separator Co., 4740 Electric Ave., Milwaukee 7, Wis.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee 4, Wis.

SHAKE-OUT MACHINERY

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
American Air Filter Co., Louisville 8, Ky.
Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Co., 2424 No. Cicero, Chicago 39, Ill.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.

SHAKE-OUT MACHINERY (Cont'd.)

Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
New Haven Vibrator Co., 131 Chestnut St., New Haven 7, Conn.
Productive Equipment Co., 2926 W. Lake St., Chicago 12, Ill.
Robins Conveyors, Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.
Royer Foundry & Machine Co., Kingston, Pa.
Simplicity Engineering Co., Durand, Mich.

SHOT AND GRIT

Alloy Metal Abrasive Co., 311 W. Huron St., Ann Arbor, Mich.
American Wheelabrator & Equipment Co., Mishawaka, Ind.
American Steel Abrasives Co., Galion, O.
Carpenter Brothers, Inc., 600 West Wisconsin, Milwaukee 3, Wis.
Clayton Sherman Abrasives Co., 3896 Lonyo Rd., Detroit 10, Mich.
Cleveland Metal Abrasive Co., 887 E. 67th St., Cleveland, Ohio.
Foundry Service Co., Birmingham, Ala.
Globe Steel Abrasive Co., Mansfield, O.
Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.
Metal Blast, Inc., 871 E. 67th St., Cleveland, Ohio.
National Metal Abrasive Co., 3560 Norton Ave., Cleveland 7, O.
Pangborn Corp., Hagerstown, Md.
Pittsburgh Crushed Steel Co., Pittsburgh 1, Pa.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.
Steel Shot & Grit Co., Inc., 39 Warren Ave., Boston, Mass.

SHOT (Peening)

Alloy Metal Abrasive Co., 311 W. Huron St., Ann Arbor, Mich.
American Wheelabrator & Equipment Co., Mishawaka, Ind.
American Steel Abrasive Co., Galion, O.
Cleveland Metal Abrasive Co., 887 E. 67th St., Cleveland, Ohio.
Globe Steel Abrasive Co., Mansfield, Ohio.
Metal Blast, Inc., 871 E. 67th St., Cleveland, Ohio.
National Metal Abrasive Co., 3560 Norton Ave., Cleveland 7, O.
Pangborn Corp., Hagerstown, Md.
Pittsburgh Crushed Steel Co., Pittsburgh 1, Pa.
Steel Shot & Grit Co., Inc., 39 Warren Ave., Boston, Mass.

SHOVELS

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Frederic B. Stevens, Inc., Detroit 16, Mich.

SHOVELS (Power)

Frank G. Hough Co., Libertyville, Ill.

SILICA FLOUR

Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, O.
Standard Silica Corp., 209 So. LaSalle St., Chicago 4, Ill.
Wedron Silica Co., 38 So. Dearborn St., Chicago, Ill.

SILICOMANGANESE

Electro Metallurgical Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

SILICON (Briquets)

Electro Metallurgical Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Ohio Ferro-Alloys Corp., Canton 2, Ohio

SILICON CARBIDE (Briquets)

Carborundum Co., Perth Amboy, N. J.

SILVERY PIG IRON see Pig Iron (Silvery)

SKIMMER BARS

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.

SKIMMERS

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Tamms Industries Inc., 228 N. LaSalle St., Chicago 1, Ill.

SKIP HOISTS

Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Gardner-Denver Co., Quincy, Ill.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

SLIP FLASKS

Adams Co., Dubuque, Iowa.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.

SLINGS (Chain)

Jeffrey Mfg. Co., Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
S. G. Taylor Chain Co., Hammond, Ind.

SLIP JACKETS

Adams Co., Dubuque, Iowa.
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Fremont Flask Co., Fremont, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.

SMELTERS & REFINERS

Federated Metals Div.
American Smelting and Refining Co., 120 Broadway, New York 5.
Niagara Falls Smelting & Refining Div., Continental-United Industries Co., Inc., 2204 Elmwood Ave., Buffalo 17, N. Y.

SNAGGING BELTS

Minnesota Mining & Mfg. Co., 900 Fauquier St., St. Paul 6, Minn.

SNAGGING WHEELS—See ABRASIVE WHEELS

SNAP FLASKS

Adams Co., Dubuque, Iowa.
Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, Ohio.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.

SODA ASH

Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, Ohio.
Hercules Powder Co., Wilmington 99, Del.
Mathieson Chemical Corp., Mathieson Bldg., Baltimore 3, Md.
Solvay Sales Division Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.

SOLDER

Federated Metals Div.,
American Smelting and Refining Co., 120 Broadway, New York 5.

SPACE HEATERS

Dravo Corp., Neville Island, Pittsburgh 25, Pa.

SPECIAL FOUNDRY ALLOYS

Niagara Falls Smelting & Refining Div. Continental - United Industries Co., Inc., 2204 Elmwood Ave., Buffalo 17, N. Y.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

SPOT WELDING APPARATUS

Metallizing Company of America, 3520 W. Carroll Ave., Chicago 24, Ill.

SPRAY GUNS

Metallizing Company of America, 3520 W. Carroll Ave., Chicago 24, Ill.
Murphy & Co., Jas. A., Hamilton, O.
New Haven Vibrator Co., 131 Chestnut St., New Haven 7, Conn.

SPRUE CUTTERS

Adams Co., Dubuque, Iowa
Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, Ohio
Milwaukee Chaplet & Mfg. Co., 1023 S. 40th St., Milwaukee, Wis.

STEEL (Structural)

American Bridge Co., Pittsburgh 19, Pa.

STOKERS (Spreader type)

Standard Stoker Co., Inc., 1701 Gaskell Ave., Erie, Pa.

STRAIGHTENING MACHINES (Malleable Iron)

Hydraulic Press Mfg. Co., Mount Gilead, Ohio

STRIPPING MACHINES

Adams Co., Dubuque, Iowa
Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa
International Molding Machine Co., LaGrange Park, Ill.
Milwaukee Foundry Equipment Co., 3228 W. Pierce St., Milwaukee, Wis.

SURFACE TREATMENT METALS

Pangborn Corp., Hagerstown, Md.
N. Ransohoff, Inc., 16 E. 72nd St., Cincinnati 16, Ohio

TAPER PINS

Standard Horse Nail Corp., New Brighton, Pa.

TEMPERATURE CONTROLLERS

Foxboro Company, Foxboro, Mass.
Illinois Testing Laboratories, Inc., 418 N. LaSalle St., Chicago 10, Ill.
Marshall Co., L. H., 270 W. Lane Columbus 1, O.

TESTING EQUIPMENT

Detroit Testing Machine Co., 19390 Grinnell Ave., Detroit 13, Mich.

TESTING LABORATORIES

Harry Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.

TESTING MACHINES (Tensile)

Detroit Testing Machine Co., 19390 Grinnell Ave., Detroit 13, Mich.
Steel City Testing Machines Inc., 8343 Livernois Ave., Detroit 4, Mich.

THERMOCOUPLES

Illinois Testing Laboratories, Inc., 418 N. LaSalle St., Chicago 10, Ill.
Marshall Co., L. H., 270 W. Lane Columbus 1, O.
Pyrometer Instrument Co., Bergenfield, N. J.
Tamms Industries Inc., 228 N. LaSalle St., Chicago 1, Ill.

—When writing advertisers, please mention THE FOUNDRY—

Classified Advertising

Positions Wanted

FOUNDRY MANAGEMENT NOTE:

21 years' practical experience in all phases of foundry work and supervision to foundry managing. Experience has been in a varied line of castings from 1 lb. to 30 ton, in steel and high alloys, also in iron and cupola practice. Well qualified for any foundry assignment. Address: Box 712, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN

Experienced in all phases of foundry practice now available in any capacity. Familiar with present day labor conditions, costs, attitude of workers and qualified to do something about it. If interested address: Box 646, The FOUNDRY, Cleveland 13, Ohio.

WORKS MANAGER
OR
FOUNDRY SUPERINTENDENT

Thoroughly capable and of proven ability to reduce costs, reduce scrap percentage and to better quality of castings. Good handler of labor relations. Ferrous metals. Address: Box 595, The FOUNDRY, Cleveland 13, Ohio.

GENERAL MANAGER

Mature, profit-minded, dependable. Has successfully managed four companies—two taken out of the red. Available for service shortly with medium-size company requiring reliable directing ability in management, sales finance and production. Excellent experience, foundry, machine and related lines. Address: Box 668, The FOUNDRY, Cleveland 13, Ohio.

COREROOM SUPERINTENDENT

Experienced in gray iron, malleable, aluminum permanent molds, production, jobbing, sand mixing, blowing machines, sandslingers and all other core room equipment. Also patternshop experience. Address: Box 598, The FOUNDRY, Cleveland 13, Ohio.

GENERAL FOUNDRY FOREMAN

Thirty years' foundry experience. Practical molder. Understands cupola. Rigging for jobbing or production. Now employed as general foundry foreman, doing grey iron and aluminum jobbing. Address: C. I. LEE, P.O. BOX 112, FARLEY, IOWA.

FOUNDRY FOREMAN
OR
ASSISTANT

In high production gray iron shop. Age 28, with practical foundry experience from molder to supervisor. Ambitious, trustworthy, cost minded and can handle men. Address: Box 707, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY ENGINEER
OR
FOUNDRY MANAGER

Aluminum—magnesium—permanent mold designer and qualified management experience. Quality and production control. Tool and machine design. Ten years' experience. Capable of taking complete charge of permanent mold foundry. Address: Box 608, The FOUNDRY, Cleveland 13, Ohio.

GREY IRON FOUNDRY
EXECUTIVE

Thirty years' experience in the production of quality castings and all phases of foundry operation. Practical and technical. Green and dry sand. Mix iron by analysis. Cupola supervision, grey iron metallurgy, quality control, foundry costs, consulting and advisory work. Address: Box 676, The FOUNDRY, Cleveland 13, Ohio.

CONSULTANT

In precision casting foundry operations. Plaster mold, pressure matchplate or investment precision casting. Address: K. Mierecke, 830 Elmwood Ave., Evanston, Ill.

Positions Wanted

PRACTICAL FOUNDRYMAN

Wishing to make change. Have had practical experience in all phases of foundry operations. Can furnish excellent references. Willing to prove my ability or no cost to you. Address: Box 663, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY CONSULTANT

FOUNDRYMAN INTERNATIONALLY RECOGNIZED AS CONSULTANT OPEN FOR POSITION WITH FOREIGN OR DOMESTIC FOUNDRY OR ENGINEERING COMPANY. LATIN AMERICA PREFERRED. ADDRESS: BOX 693, THE FOUNDRY, CLEVELAND 13, OHIO.

METALLURGIST

Graduate metallurgist experienced in sand control, cupola operation and development. Desires connection with progressive foundry as research or production metallurgist. Cost and quality minded. Address: Box 694, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOREMAN

Twenty years' supervisory experience on production molding. Familiar with sandslingers. Complete knowledge of cupola operation and steel melting. Well versed in sand, natural or synthetic. Address: Box 727, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MANAGER
OR
FOUNDRY SUPERINTENDENT

Twelve years' experience in producing aluminum, magnesium, stainless and heat resistant castings. Graduate engineer with complete knowledge of all phases of foundry work, casting design, labor management and sales trouble shooting. Address: Box 684, The FOUNDRY, Cleveland 13, Ohio.

MECHANICAL ENGINEER

Many years of broad practical experience in top supervision of modern foundries and as consultant in technical, production, management and organization problems. Will consider temporary or short term employment. Address: Box 703, The FOUNDRY, Cleveland 13, Ohio.

COLORADO, WASHINGTON, OREGON
OR NORTHERN CALIFORNIA

Young family man desires to make home in one of these states. Has excellent college (6 years) and educational background, a foundry trainee course with large company and experience in production and jobbing plants. Well-versed in grey iron, malleable and good success with NODULAR IRON. Have operated and supervised cupola, air and electric furnaces. Good background and active in sand, laboratory, gating and risering, etc. Capable of management position. Presently employed as technical advisor. Address: Box 675, The FOUNDRY, Cleveland 13, Ohio.

PRACTICAL FOUNDRYMAN

Energetic practical foundryman with twenty years experience in jobbing and production of ferrous and nonferrous metal. Light, medium and heavy work. Ten years in supervision and thoroughly experienced in all phases. Excellent labor relations record. Desires connection with an aggressive medium sized foundry. College graduate. Address: Box 724, The FOUNDRY, Cleveland 13, Ohio.

NONFERROUS FOUNDRY
WORKING FORMAN

39 years' practical experience on jobbing in copper, bronze, high tin bronze and aluminum. Will make change at once. Go anywhere. Address: 722, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MANAGER—SUPERINTENDENT

45 years of age with twenty-seven years of experience of which fifteen years were in executive capacity. Successfully managed both production and jobbing gray iron foundries which had capacities of over one hundred tons daily. Initial experience was a ten year practical shop course in management. Address: Box 709, The FOUNDRY, Cleveland 13, Ohio.

Engineering Service

PRACTICAL—ADVISORY SERVICE

SAMUEL APPELBY
GRAY IRON FOUNDRY CONSULTANT
74 LAMARCK DRIVE **TELEPHONE**
BUFFALO 21, N. Y. **UNIVERSITY 7146**

IMPROVE QUALITY—REDUCE SCRAP—LOWER COSTS—HEAVY CASTINGS BY CONTROLLED METHODS

Are you getting the maximum production out of your foundry and its equipment? If you don't think so contact—

PALMER E. HANSON
Foundry Production Engineer
648 Crescent Court
Wauwatosa 13, Wis.

I have thirty years' foundry production and jobbing experience to offer—nothing else to sell.

Opportunities

OPPORTUNITIES

Fully equipped nonferrous foundry located in Detroit — going business — approximately 7000 square feet—building 30 feet high monitor type construction. Will sell or lease very reasonably. Address: Box 654, The FOUNDRY, Cleveland 13, Ohio.

OPPORTUNITY

Belgian cast steel foundry properly equipped for manufacture of large series items (rough or machined) high grade steels would like to deal (under license) with American patents having reliable references in the States. Please write to publishers. Address: Box 723, The FOUNDRY, Cleveland 13, Ohio.

Employment Service

SALARIED PERSONNEL

$3,000-$25,000. This reliable service, established 1927, conducts confidential negotiations for high-grade men who seek a change of connection under conditions assuring, if employed, full protection to present position. Send name and address only for details. Personal consultation invited. Address: JIRA THAYER JENNINGS, 241 ORANGE STREET, NEW HAVEN 10, CONN.

SALARIED POSITIONS
$3,500—$35,000

If you are considering a new connection communicate with the undersigned. We offer the original personal employment service (39 years recognized standing and reputation). The procedure, of highest ethical standards, is individualized to your personal requirements and develops overtures without initiative on your part. Your identity covered and present position protected. Send only name and address for details.

R. W. BIXBY, INC.
101 DUN BLDG. **BUFFALO 2, N. Y.**

SALARIED POSITIONS

$4,000 to $30,000. This confidential service for men who desire a new connection will develop and conduct preliminary negotiations without risk to present position. Send name and address for details. Address: TOMSETT ASSOCIATES, 1203 BERGER BLDG., PITTSBURGH 19, PA.

Classified Advertising

Open Capacity

AVAILABLE CAPACITY

Our foundry has open capacity to supply small and medium size gray iron castings. Send sample. Address: OREGON CASTINGS CO., RD 3, Lititz, Pa.

Wanted-To-Buy

WANTED

Pridmore drop pattern stripping plate molding machines. Advise sizes available. ADDRESS: HARRY C. WEISKITTEL CO., INC., 4901 PULASKI HIGHWAY, BALTIMORE 24, MARYLAND.

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price or immediate acceptance. Address Box 578, The FOUNDRY, Cleveland 13, Ohio.

WANTED

Cloth filter type dust collector with spark arrestor—10,000 to 15,000 C.F.M. capacity. Also vertical core oven. Send specifications and price to: Box 664, The FOUNDRY, Cleveland 13, Ohio.

WANTED

Patterns for Bell and Spigot and Flanged cast iron fittings, sizes 4-inch and larger. Address: Box 612, The FOUNDRY, Cleveland 13, Ohio.

WANTED

1—Small diameter cupola inside lined diameter 24 inches or less, with or without blower and controls. Give description of equipment offered and itemized prices.

TIOGA FOUNDRY CORPORATION
BOX 136 OWEGO, NEW YORK

Foundries For Sale

FOUNDRY FOR SALE

Corporation desires to sell its gray iron production foundry near Kansas City. Good scrap market and utilities extremely low. Two railroad sidings. Capacity 10 to 15 tons daily. 30,000 sq. ft. floor space, pouring room 300 ft. long with overhead conveyors. Modern core room. Plant well equipped. Location presents many advantages for low cost production with ideal labor situation. Can be used for general manufacturing. Reasonably priced. Address: Box 602, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Combination gray iron and brass foundry in fast growing central Texas City of 100,000. Equipment includes #3 Whiting cupola with automatic charger. Price $6500.

WACO FOUNDRY INC.
BOX 583 WACO, TEXAS

FOR SALE

Gray iron foundry. 60 miles from Detroit. 12 molder shop. Squeezer and light jobbing. Automatic charger on cupola. Plant now operating 15,000 sq. ft. Owner must sell. Address: Box 660, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Ideal for small foundry, all equipment necessary to manufacture cast iron radiators. Includes steel patterns, flasks, bottom plates, weights, core patterns, core driers, etc. Bargain for quick sale. Address: Box 715, The FOUNDRY, Cleveland 13, Ohio.

Foundries For Sale

GRAY IRON FOUNDRY And Product, with unlimited possibilities; presently doing $75,000 a year on this product; plus job work being done for several nationally reputable corporations, customers for several years.

The leading industry in the town of 1800 people, located in the North Central Part of Pennsylvania.

Ample scrap supply locally at reduced prices and geographically located for economical transportation of pig iron and coke.

Ample skilled and unskilled labor. $32,000 purchases, business, factory real estate, foundry equipment, truck, materials and a home.

It is a real bargain and an opportunity of a lifetime.

BOX 691
THE FOUNDRY CLEVELAND 13, OHIO

FOUNDRIES FOR SALE

GRAY IRON FOUNDRY. Large foundry fully mechanized with mould conveyors, overhead sand system, etc. Good organization. Location Pennsylvania.

GRAY IRON FOUNDRY. Small foundry well equipped for production of light castings. Steady customers. A bargain.

EDWARD H. ZOLL
INDUSTRIAL PROPERTIES THROUGHOUT THE EAST
790 BROAD ST., NEWARK, N. J.

FOUNDRIES FOR SALE

Two gray iron foundries priced at $7,000 and $25,000 each. Small deposit, balance, easy terms. Information address: BROKER, 5 FRANCONIA ST., WORCESTER, MASS.

For Sale

FOR SALE

TURBO BLOWERS (3 Phase, 60 Cycle)

cfm	Pressure	Make	Motor H.P.	Volts	Speed
3500	40 oz.	Spencer	60	440	1800
2200	40 oz.	Spencer	40	220/440	3600
1400	16 oz.	Spencer	220/440	3/60	3600
1050	32 oz.	Spencer	15	550	3500
900	24	Spencer	15	220/440	1800
225	10	Spencer	1	220/440	3600

PRESSURE BLOWERS (3 Phase, 60 Cycle)

2500	7 oz.	Sturtevant	15	220/440	1800
2400	14 oz.	Mahr	15	220/440	3480
1300	16 oz.	Nth.Amer.	10	440	1800
1150	20 oz.	Nth.Amer.	10	220/440	3600
950	16 oz.	Nth.Amer.	7½	220/440	3600
660	20 oz.	A & B	7½	440	3600
550	20 oz.	A & B	5	440	3600
450	6 lbs.	A & B	30	220/440	3450
340	20 oz.	A & B	3	440	3600
250	12 oz.	Gen. Elec.	2	220/440	3600
150	12 oz.	Nth.Amer.	1	220	3600

MOTOR REPAIR & MFG. CO.
1552 HAMILTON AVENUE
CLEVELAND, OHIO
FOR SALE

FOR SALE
SAND HANDLING SYSTEM

19 individual moulders' hoppers, two 25 ton sand storage bins, one #50 Beardsley & Piper speed muller with 40 HP motor, magnetic separator with bucket elevator, overhead monorail system and cab controlled electric hoist and monotractor and shell buckets with automatic trips for delivering sand from speed muller to moulders' hoppers.

OLD COLONY FOUNDRY COMPANY
EAST BRIDGEWATER MASSACHUSETTS

For Sale

FOUNDRY EQUIPMENT
BLOWERS

1—"American" #2V with 1 HP motor
1—"Spencer Turbine" 32 oz. 1050 CFM with 15 HP mtr.
1—"American Sirocco" #3½ with 5 HP mtr.
1—"Buffalo" #3½ duplex conoidal with 2 HP mtr.
1—"American" #5 with 5 HP mtr.
1—"American" #5 with 5 HP mtr.
1—"American" #5 with 5 HP mtr.
1—"American" #5 with 7½ HP mtr.
1—"Spencer Turbo" #316-B2-1 with 5 HP mtr. 24 oz. 150 CFM
1—"American" 5V with 5 HP mtr.
1—"American" #4 with 3 HP mtrs.
1—Low pressure, 32 oz., 1600 CFM, "G.E." with a 20-24 HP motor, 3600/3/60/440
1—"American" #6V with motor

MOULDING MACHINES

6—Tabor molding mchs., split pattern-jolt squeeze 13" x 18"
2—Tabor molding mchs., special shockless jar squeezer 10"
1—Osborn #42 Molding mch, portable
1—Arcade molding mch, portable—hand draw and jolt 16" x 12" plate

MISCELLANEOUS

1—Sand blast room "Sly" 10' x 10' complete with tank, blower and mtrs.
1—Vacuum Cleaner, portable "Spencer Turbine" with 3 HP motor
1—Alligator shear "Hendley & Whittemore" #46 less motor
1—Snag Grinder, "Standard" double end, 18" wheel
1—"Ingersoll Rand" Air Compressor, 2 stage Imperial type 10B low pressure side 22" dia. x 16" stroke—high pressure side 13" dia. x 16" stroke, with 200 HP induction motor, slip ring type and controls
1—Ingersoll Rand air compressor, 2 stage Imperial type XB, right hand size 16" x 14", left hand size 10" x 14", with 104 HP motor, starter, flat belt drive and air receiver tank 3½' dia. x 10' h.

FURNACES & OVENS

1—Furnace, elec. heat treat, "Electric Furnace Co." 14' L x 6' W x 6' hi., 250 KW-220V complete with controls
1—Furnace, heat treat, "Industrial-Circ Air" gas fired car type 14' L x 6'6" W x 6' hi., complete
1—Furnace, annealing-continuous, "Industrial Heating", 26'6" x 6' W x 17" hi., gas fired, complete
7—Furnaces, melting "Bellevue", 550# capacity
10—Bohn oil fired brass melting furnaces, pit type for No. 80 crucibles.
1—Atmosphere converter (gas cracker) gas fired G.E. mod. #6990139-G4, 500 CFH
1—Oven, normalizing gas fired "Dewey" 6' W x 7' D x 6' H outside dim.
1—Furnace, melting gas fired muffle type Surface Combustion
1—Furnace, melting, rotary hearth, gas "Continental" approx. 18' dia.
1—Furnace, pre-heating rotary hearth, elec. "G.E.", 175 KW, 18' dia.
1—"Lindberg" cyclone tempering furnace, type 6012042EH, 1800KW, 3/60/440 with (2) 3 hp motors, 2 zone control panel with model 5 "L&N" recorder-controller, Wheelco limitrol and Lindberg type A fuel input controller
1—Oven type furnace "American Gas Furnace Co." #1, 7" x 12" x 29"
27—Fisher melting furnaces, size B for #25 crucible
11—Hoskins electric furnaces, model FR 252.9 box type, 2000 deg. F. 26 KW
6—Monarch simplex melting furnaces, 500# cap., model #92, oil fired—hand rocking, 1 burner on each end of furnaces, rammed with plastic brick and lined with 1" of SO 38 refractory
1—Maehler core oven, 2 compartment, approx. 15' L x 5' W x 6' H inside dim. each compt., complete with core carriers, track, motors and blowers
1—Monarch Simplex furnace, 1000 lb. cap. with blower and motor.

BOHN ALUMINUM & BRASS CORP.
1400 LAFAYETTE BLDG., DETROIT 26, MICH.

FOR SALE

Patent for drinking fountain for cattle, suitable for manufacture by a gray iron or aluminum foundry. Address: H. C. MUNSON, MASSENA, NEW YORK.

Classified Advertising

For Sale

SURPLUS MACHINERY SALE

PIECE-BY-PIECE THRU PRIVATE NEGOTIATION—MOST OF THE EQUIPMENT ONLY A FEW YEARS OLD

BY ORDER OF THE SYMINGTON-GOULD CORPORATION—AT DEPEW, N. Y. PLANT

10-Ton Erie O.E.T. Crane 3 Motor 40 ft. lift.
15-Ton Single Leg Gantry Crane
(3) Osborn Pattern Draw Molders—Jolt Roll-over Type
(2) Herman Cope Molder and Draw Molder
BEARDSLEY & PIPER SAND SLINGER—16' 4" RADIUS 2000# SPM
450 Ton Double Sand Bin
850 cu. ft. Round Storage Bins
100 Ton Steel Sand Storage Bins
70 Ton Sand Hoppers with Conveyors and others
Simplicity Dual Shakeout
5 Units Car & 8' Table Type Shot Blasts Complete Units with dusting collecting systems. Original cost over $87,000—A Real Bargain!
Buffalo Air Washer 38,800 cfm.
3 "Skin Dry" Ovens 1 "Mold Dry" Oven
Belt Conveyor 345' long (upper) and 182' (lower) inclined
Belt Conveyor 24" wide 50 ft. centers
Belt Conveyor 18" wide 28 ft. centers
Six Wilson Portable Welding Machines
Two U. S. Swing Grinders 10 HP AC
New Northern Hydraulic Pump

Sale under direction of — *Write for full data—Refer to File* 163-2

ASSET REALIZATION CO. 26 EMERSON PLACE, NEWARK 5, N. J.

FOR SALE

PRICES REDUCED TO CLEAN UP LIQUIDATION

OF RICHMOND'S UNIONTOWN RADIATOR FOUNDRY

1—Coleman Tower Core Oven—27 carriers—84" x 25", 45' high
1—Mayer Tower Core Oven—16 carriers—60" x 24", 25' high
1—500T Neff & Fry Sand Silo—60T P.H.—20" x 48' elevator
1—Molding Sand Handling & Conditioning Outfit, $100,000 orig. cost—like new with Conveyors, Elevators, Speedmullor, Vibrators, etc.
1—Steel Structure for above unit

Cranes, Hoists, Cupolas, Turntables, Shakeouts, Jolt & Squeeze, Rollovers, Air Receivers, Motors, & the hundreds of items found at all large foundries

HETZ CONSTRUCTION CO. BELLE VERNON, PA. P. O. BOX 106—PH 576

FOR SALE

Whiting #3, model B cupola, complete with automatic skip-hoist, blower and spark arrester. Herman Pneumatic turnover and pattern drawing machine, 40" x 58", 3000 lb. 18" cylinder, equipped with 45" arms, practically new, complete with controls. Two Kron (Yale & Towne) scales, one 4400 lb. portable platform (30" x 30"), other 1100 lb. dormant platform (46" x 38"). For further details, write BOX 706, THE FOUNDRY, CLEVELAND 13, OHIO.

FOR SALE

One Special Whiting No. 9 model B cupola. Purchased new in 1942.
Cupola blower—one General Electric No. S-367-EI Type FS-367
C.F.M.—8500 Volume 1.25
R.P.M.—3540
One General Electric motor 75 H.P.

BOX 698
THE FOUNDRY CLEVELAND 13, OHIO

FOR SALE

One Dings magnetic separator 42" dia. 110 volts D.C. for mounting on end of dryer or rotary screen at substantial savings. Never used due to change in process. Still in original crate. Address: Box 704, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY EQUIPMENT

1—Osborn Core Blower, No. 193
1—Demmler Core Blower, Style 3-E
1—Osborn Core Box Drawing Machine #146
Molding Machines—Herman R. O. 1500 lb. cap.
Osborn Jolt Squeezers, various sizes
1—#1 Simpson Mixer, motor drive
1—#30 B. & P. Speedmullor

RAY P. SCULLY
SCULLY MACHINERY & EQUIPMENT CO., Not Inc.
767 Milwaukee Ave. Chicago 22, Ill.
Phone: Canal 6-0314

FOR SALE

2 Only 4 Ton Model M. Wright Manufacturing Co. Chain Hoists
1—28" Walker York Hot Blast Tilting Furnace
60—Tercod Pedestal Blocks HB-28-11½ HI for above furnace
1—Beardsley and Piper Type MC Screenerator
500#—New 1" Mill Stars
500#—Second Hand 1" Mill Stars
2—Forced Draft Coke Burning Mold Driers
1—6 Ton Model K Cyclone Chain Hoist
1—Sly Duplex Tumbler NTO-30 complete with 5 H.P. motor and reduction gears

THE PRESCOTT COMPANY
MENOMINEE, MICHIGAN

EQUIPMENT FOR SALE

MOLDING MACHINES
1—74J-W Osborn Jolt Squeeze Portable.
2—75J-W Osborn Jolt Squeeze Portable.
3—75J Osborn Jolt Squeeze Portable.
1—Haynes 10" Jolt Squeeze Portable.
1—Haynes 12" Jolt Squeeze Portable.
3—Federal RAPID Jolt Squeeze Portable.
2—SPO #611B Stationary, Oscillating, Jolt Squeeze Strippers.
1—SPO #4½ JHS Air Jolt Hand Strip.
4—Osborn #36 Core Box Drawing Machines.
BLOWERS FOR CUPOLAS AND FURNACES
1—Piqua rotary pressure blower, rated 19 cu. ft. per revolution.
Maxon-Premix Blowers for Gas, ¼ to 1 H.P.
METAL MELTING EQUIPMENT
1—Hausfeld 2000# aluminum capacity furnaces, barrel type, open flame, oil fired.
2—Monarch-Rockwell Rotating, 500# brass, oil.
1—Buckeye #150 Crucible tilting furnace, with Premix blower for gas fire.
New 32" to 41" Dia. shell Cupolas made to order.
TUMBLING MILLS AND SAND BLAST
1—Pangborn style GJ-1 rotoblast barrel, complete with Pangborn style FM automatic loader. Load capacity approximately 16 cu ft.
1—Pangborn No. 2 GH direct pressure type sandblast barrel, motor driven. Complete unit.
1—Pangborn LE 6 ft. sandblast table, continuous sand feed, motor driven. Complete unit.
1—Pangborn LE 4 ft. sandblast table, continuous sand feed, motor driven. Complete unit.
1—Pangborn Sand Blast Unit including generating tank, shot cleaner, bucket elevator. Suitable for use with room.
1—Pangborn type EN-2 sand blast cabinet, suction type, 5 x 3 x 7 high.
MISCELLANEOUS
1—Gardner-Denver air compressor complete with 5 HP 3/60/220 motor and controls.
4—Heavy duty flexible shaft grinders 2 HP.
1—Heavy Duty Back Geared Sprue Cutter, 1½" square knives, T & L Pulley Drive.
1—Fay & Egan 14" blade revolving, double arbor, tilting table, variety saw with roller table.
1—Young Bros. Co. tower core oven, 5' x 1' shelves, gas fired, complete with Foxboro Control.
1—Young Bros. Co. batch type recirculating hot air gas fired core oven, 5' x 6' door opening, 9' deep.
3—Foundry Equipment Co., Sliding shelf core ovens with five 30 x 42" shelves, 8" high. Gas Fired.
1—Lampson Endless Mold Conveyor 100' long x 16' wide, with 19 x 26" pallets, 36 inches on centers.

CLIFTON MACHINERY CO.
1023 W. 6th ST. CINCINNATI 3, OHIO
PHONE PARKWAY 7812

MACHINERY FOR SALE

Two—Arcade #750 jolt squeeze strippers used less than one month priced to sell. Address: Box 688, The FOUNDRY, Cleveland 13, Ohio.

MACHINE TOOLS FOR SALE

5—Bullard Vertical Turret Lathes, 42" tables.
5—Bullard two-head Maxi-mills, 42" tables.

All in first class usable condition, complete with motors. Also other machine tools.

THE LOCOMOTIVE FINISHED MATERIAL CO.
ATCHISON, KANSAS

FOR SALE

(2) Herman 20" x 30" high speed 750# series pitless type jarr rollover and pattern drawing machines. The jarring machines of these units are built with 6" cylinder and a jarring capacity of 1700# at 80# air pressure. Purchased new 1942.

BOX 711
THE FOUNDRY CLEVELAND 13, OHIO

FOR SALE

5—OSBORN ROLLOVER JOLT MOULDING MACHINES.

Stationary, model 2047-I. Flask space 22½" x 21½" draw 11½".

These machines are like new and are priced for a quick sale at $175.00 each. Original cost $2400.00 each, weight 3500 lbs. each.

CANTON INDUSTRIAL SALVAGE CO.
325 ELEVENTH ST. S.E. CANTON, OHIO

Classified Advertising

For Sale

FOR SALE

2—American Wheelabrator Tumblasts 36" x 42" Serial Numbers 48355 and 54532
1—American Wheelabrator Multi Tablast Model BM 66200 Serial Number A50689
1—Beardsley & Piper Speed Mullor Model 40
1—Whiting Cupola #6—Windbox only—never used
1—Whiting Cupola #6—50 foot stack. Dismantled and in excellent condition
1—Louden Overhead Monorail Pouring System 1000 feet of track and 19 bridges
1—Spencer Turbo Compressor with 40 HP motor
12—Overhead Pouring Devices
1—Simpson Mullor Model O
1—Beardsley & Piper Screenarator Model M
1—Root Blower Number 7
1—Champion Core Blower Model CB10
1—Osborn Core Blower Model 91
1—Lindberg Pit Type Tempering Furnace Type 2828-EH Serial Number 1337
12—Tabor Stationary Jar Top Squeezers
4—Osborn Squeezers 276-J
1—Osborn Squeezer 275-J
2—Tabor Jar Ram, Hand Rollover, Hand Draw Moulding Machines .
Rollover, Hand Draw Moulding Machines
6—Tabor Hand Ram, Power Rollover, Hand Draw Moulding Machines
2—Tabor Portable Jar Flask Lift Moulding Machines—Table size 20" x 24"
1—Tabor Portable Shockless Jar Flask Lift Moulding Machine—Table size 32" x 32"
1—Osborn Pin Strip Machine Model 720U Table size 19" x 22"

OLD COLONY FOUNDRY CO.
EAST BRIDGEWATER, MASSACHUSETTS

FOR SALE

1 only—Symbol FX355 Ingersoll-Rand Cupola Blower, Serial No. 3-355-010, rated 4600 CFM, 1-0 MPR, 30 HP, 40 degree, 3500 RPM, 200 volt, 3 phase, 60 cycle, standard open motor, Autocostant air weight control mechanism, including current transformers and starting compensators, subject to prior sale, price $1000.00 f.o.b. Fairfield, Iowa.

1 only—No. 6 Whiting Cupola, complete with charging doors, bottom doors, legs and approximately 35 feet of stack. Price $1000.00 f.o.b. Fairfield, Iowa, subject to prior sale.
Both cupola and blower, practically good as new and in excellent operating condition.

DEXTER COMPANY
FAIRFIELD, IOWA

FOR SALE

1—Model 7 GK 2 P Pangborn rotoblast Airless barrel type—7 cu. ft. cap. Barrel size 30 x 38, 1200 lb. per lead—new in 1944. Very little use. Send your inquiries for all foundry equipment to:

BALCHER MACHINERY COMPANY
1884 S. COMPTON ROAD
CLEVELAND HEIGHTS 18, OHIO

FOR SALE

(12) Tabor 16" Jolt Squeeze Machines as taken out of use. All machines in operating condition. Price each.....$50.00
(2) Osborn No. 275J Jolt Squeeze Machines. Used but in excellent condition. Price each $275.00
(1) Yale 2 Ton Chain Hoist with trolley.$110.00
Various sizes in flasks and jackets. Write for price list.

THE FREEMAN SUPPLY COMPANY
1153 EAST BROADWAY TOLEDO 5, OHIO

FOR SALE

ELECTRIC MELTING FURNACE

TOP CHARGE 9 FT. DIAM. SHELL, WITH 2500 KVA TRANSFORMER. VERY LITTLE USED, IN GOOD CONDITION.

FRANK B. FOSTER, INC.
2217 OLIVER BLDG. PITTSBURGH 22, PA.

For Sale

FOR SALE

1—Type P Class 1 Jeffery Sanditioner Serial No. 448, complete with motor used approximately 250 hours.
1—10' Roto-cast revolving mold conveyor complete.
1—Type GF Pangborn sand blast less motor.

BOX 655
The FOUNDRY CLEVELAND 13, OHIO

FOR SALE
IN GOOD CONDITION

Cupola Blower. One General Electric centrifugal compressor. Type—F.S. 377, volume 10500, pressure 1.25, speed 3500.
General Electric Motor. Type FT 529 Y2 85 3600 Form E, volts 440, 3 phase, 60 cycle, No. 5226386.
With blast gate control panel, blast gate and motor starter.

BOX 699
THE FOUNDRY CLEVELAND 13, OHIO

FOR SALE

45,000 pounds U. S. Graphite #866 Pipe Eliminator

Excess Inventory from Naval Gun Factory, Washington, D. C.

Packed in 100 pound paper lined cloth bags.

Dry, new condition.

Location—Washington, D. C.

AT FRACTION OF PRESENT MARKET PRICE

BOX 726
THE FOUNDRY CLEVELAND 13, OHIO

FOR SALE

1—Pangborn G. J. 1 rotoblast barrel—serial No. 7101366, type R.A. rotoblast wheel, type F.M. Loading device. This barrel now in operation. Address: Box 710, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Gardner-Denver stationary air compressor, Model WBE 3005, Serial #82625. Vertical three stage—7&5¾ x 5 three cylinder—water cooled —40 Horse Motor 220 or 440 direct drive. Guaranteed like new— $1600.00. Address: Box 717, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Ransohoff Drum Type Wash Rinse and Dry Machine, Serial No. 2525, capable of handling items up to 6" on the longest dimension.
Two Goulds pumps, rotary, I M B 2 S head 289-ft. 3550-gpm with Westinghouse 15 HP—3 phase 60 cycle—220/440 volt motors.
Niagara #56 hand lever punch 24" throat, bench type.
Detrex Corp dressing solvent reclamation still 36" wide 48" deep x 74" high W ½-3-60-220/440 Howell motor Model S50.
Rivet sorting machine, 3 feed hoppers 2 motors.
Alemite 7' x 3' x 3' steel tank 259' lead cooling coil.
Skinner Bros. Baltz Pot 4-1 heating unit.
One Spray Booth Roto-Clone Hydra-Static precipitaton Type N Class 500 Size 8.
One Washing Machine model 9427 Drying systems Inc 100 gpm Cost $763. Automatic cleaning operation.
3D Gardner buffing machine 5 HP motor 220/440. New in 1944. Each side can be operated independently.

MANSFIELD SANITARY POTTERY INC.
PERRYSVILLE, OHIO

OFFERING FOR IMMEDIATE SALE

ONE TYPE S 16" x 26" x 48" CONNERSVILLE BLOWER COMPLLTE WITH MOTOR IN GOOD RUNNING CONDITION. NEED ROOM FOR LARGER INSTALLATION SO NO REASONABLE OFFER REFUSED. ENOT FOUNDRY COMPANY, WAYNE, MICHIGAN

FOR SALE

1—#9 Whiting Cupola complete with Motor, Blower, and Blast Regulators.
1—#10 Whiting Cupola complete with Motor, Blower, and Blast Regulators.
1—#30 Beardsley and Piper Speedmuller with Loader.
1—27 x 36 Wheelabrator complete with Loader.
1—#1 Demmler Core Blower.
1—#2 Demmler Core Blower.
1—#3 Demmler Core Blower.
1—#193-8 Osborn Core Blower.
1—American Sand Cutter.
1—Johnson & Jennings Rollover Machine 24 x 30 table.
Many other items too numerous to mention.

HAYNES FOUNDRY EQUIPMENT CO.
814 ADA ST. KALAMAZOO 52, MICH.

FOR SALE

1—Lindberg type SF stationary gas fired furnace with silicon carbide lining and heavy installation. Burner has proportional mixer and control for low pressure gas. Accommodates #80 crucible. Address: Box 696, The FOUNDRY, Cleveland 13, Ohio.

SURPLUS FOUNDRY EQUIPMENT FOR SALE

Top quality, excellent operating condition. Molding machines, benches, tumbling mills, pouring buggies and other supplies. For complete listing address: .

BOX 723
THE FOUNDRY CLEVELAND 13, OHIO

CLASSIFIED ADVERTISING RATES

POSITION WANTED—Minimum advertisement set solid, 30 words, $2.00. Additional words 7c each.

ALL OTHERS—"Help Wanted"—"For Sale"—"Wanted"—"Personals"—"Services", etc., minimum advertisement set solid, 30 words or less, $4.00. Additional words 12c each.

NOTE—If replies are to be sent to a box number in care of THE FOUNDRY, add 6 words to your advertisement for box number and address.

Any advertisement set in all capital letters, add 50% to the above rates.

* * *

Classified advertising forms close 13th of month preceding issue.

Story of the two "missing days"

Back in 1910, when a man left his home on Monday morning, he had a 58-hour work week before him.

But over the years—as workers, business and manufacturing methods all got more efficient—it took less and less working time to produce goods of all kinds.

The result is that today the average work week has been cut to 40 hours. 18 hours—more than two whole working days—are missing from a man's work week. They've been transferred to the man himself—to use for leisure time!

But that's not the whole story. Back in 1910, the average household earned about $2400 for its year's work. Today, for a lot less work, it earns nearly *twice* that! And in dollars of the same purchasing power, too.

That's the American economic system at work.

This system has some faults—such as ups and downs in prices and jobs. And everybody in this country, except a small group of eccentrics and communists, is working to correct them.

But just remember this: If you want to earn still more money—if you want to work still shorter hours—the only way to do it is to make the American system work even *better*. And that means that every man, every business, every machine has got to produce more and more for every hour they work—just as they've *been* doing since 1910. And if they do, the gains can be shared by everyone.

All of us in this country *want* the system to work better. And if all of us work together—you can be dead sure it *will*.

The Better We Produce—The Better We Live

Approved for the PUBLIC POLICY COMMITTEE of The Advertising Council by:

EVANS CLARK, Executive Director The Twentieth Century Fund
BORIS SHISHKIN, Economist, American Federation of Labor
PAUL G. HOFFMAN, Former President Studebaker Corporation

Like many American firms, we believe that business has a responsibility to contribute to the public welfare.
This advertisement is therefore published as a public service by:

THE FOUNDRY

FREE . . . *send for this interesting booklet today!*

Approved by representatives of Management, Labor and the Public.

In words and pictures, it tells you
—How our U. S. Economic System started
—Why Americans enjoy the world's highest standard of living
—Why we take progress for granted
—How mass production began
—How we have been able to raise wages and shorten working hours
—Why the mainspring of our system is productivity
—How a still better living can be had for all

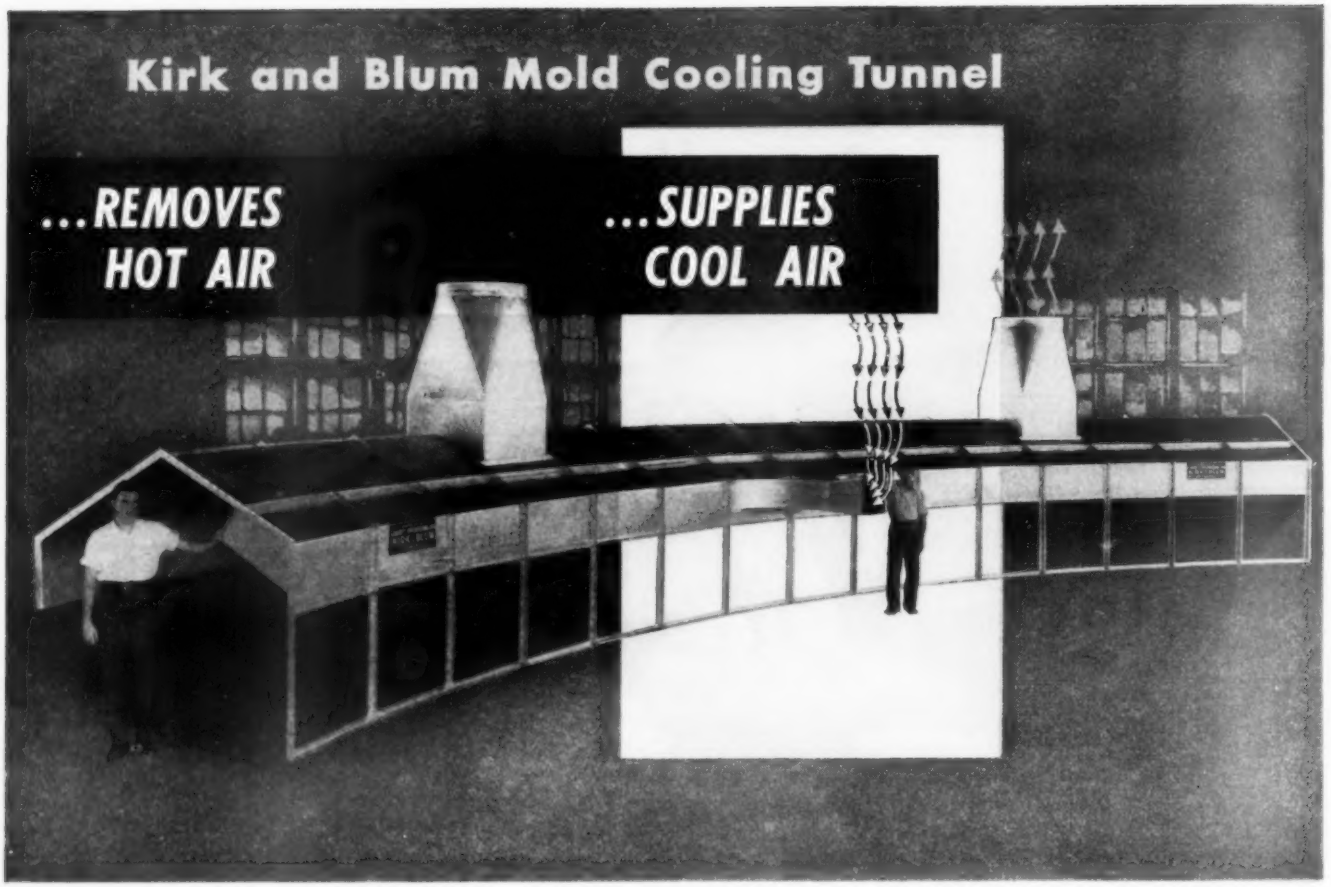
MAIL THE COUPON to Public Policy Committee, The Advertising Council, Inc., 25 West 45th Street, New York 19, New York.

NAME_____

ADDRESS_____

_____

OCCUPATION_____



SOLUTION to the problem of efficiently cooling castings and at the same time, removing hot air, is illustrated here in the plant of National Malleable & Steel Castings Co., Indianapolis, Ind. The "quarter-circle" of hood is supplied with a built-in duct which supplies cool air all along the mold cooling conveyor. This air, drawn from outside the foundry, picks up heat from the castings and is then exhausted outside the building. The hood is supported on just one side so there is minimum interference with trucks on the "aisle side" and cleaning is made easier.

Engineering ingenuity such as this is just one reason why plants . . . large and small . . . in every industry depend on KIRK & BLUM for efficient cooling and dust and fume collection. The 40-year store of experience behind KIRK & BLUM engineering, fabricating and installation service is yours to command; refer your air-handling problems to KIRK & BLUM.

Designed, Fabricated and Installed by Liberty Engineering, Div. Kirk & Blum, Indianapolis, Ind.

FOR CLEAN AIR . . . THE [redacted] TOOL

KIRK AND BLUM
DUST AND FUME CONTROL SYSTEMS

THE KIRK AND BLUM MANUFACTURING COMPANY
2808 Spring Grove Ave. ● Cincinnati 25, Ohio

ADVERTISING INDEX

A

Acheson Colloids Corp. 157
Adams Co., The 42
Air Reduction 185
Ajax Electric Co., Inc. 33, 206, 207
Ajax Electric Furnace Corp. 33, 206, 207
Ajax Electrothermic Corp. 33, 206, 207
Ajax Engineering Corp. 33, 206, 207
Ajax Metal Co. 33, 206, 207
Allis-Chalmers Mfg. Co. 21, 39
Alloy Metal Abrasive Co. 245
American Air Filter Co., Inc. 11
American Bridge Co. 255
American British Chemical Supplies, Inc. 256
American Colloid Co. 24
American Crucible Co. 175
American Gum Products Co. 246
American MonoRail Co., The 195
American Optical Co. 44
American Steel Abrasives Co., The 249
American Wheelabrator & Equipment Corp. 40, 106, 107, 123, 201
Angell Nail & Chaplet Co., The 241
Apex Smelting Co. 15
Arrow Tools Inc. 237

B

Baroid Sales Div., National Lead Co. 220
Bartlett, C. O., & Snow Co., The 121
Bay State Abrasive Products Co. 109
Beardsley & Piper, Div. of Pettibone Mulliken Corp. 160, 161, 162, 163
Black, Sivalls & Bryson, Inc. 227
Blystone Div., Standard Sand & Machine Co. 242
Buckeye Products Co., The 253
Buffalo Pattern Works 171

C

Campbell-Hausfeld Co., The 199
Carl-Mayer Corp. 281
Central Pattern Co. 242
Centrifugal Casting Machine Co. 247
Champion Foundry & Machine Co. 8, 9
Chicago Mfg. & Distributing Co. 18
Chisholm-Moore Hoist Corp. 222
Clayton-Sherman Abrasives Co. 55
Clearfield Machine Co. 213
Cleco Div., of the Reed Roller Bit Co. 151
Cleveland Automatic Machine Co., The 113
Cleveland Chaplet & Mfg. Co. 255
Cleveland Electro Metals Co., The 236
Cleveland Flux Co., The 119
Cleveland Metal Abrasive Co., The 187
Cleveland Tramrail Div., The Cleveland Crane & Engineering Co. 165
Climax Molybdenum Co. 230
Columbus-McKinnon Chain Corp. 222
Combined Supply & Equipment Co., Inc. 246
Construction Machinery Co.'s 257
Corn Products Refining Co. 153
Crobaugh, Frank L., Co., The 255
Crucible Manufacturers Assoc. 226

D

Davenport Machine & Foundry Co. 181
Dayton Pneumatic Tool Co. 253
DeBardeleben Coal Corp. 256
Delta Oil Products Co. 14
Demmler, Wm., & Bros. 189, 243
Desmond-Stephan Mfg. Co., The 241
Despatch Oven Co. 16
Detroit Electric Furnace Div., Kuhlman Electric Co. 211
Detroit Sheet Metal Works 252
Dietert, Harry W., Co. 257
Dravo Corp. 242, 251

E

Eastman Kodak Co., X-Ray Div. 133
Eclipse Fuel Engineering Co. 179
Eldorado Mining & Refining Ltd. 244
Electric Furnace Co., The 254
Electro Metallurgical Div., Union Carbide & Carbon Corp. 36
Electro Refractories & Alloys Corp. 255
Erie Steel Construction Co. 231

F

Federal Foundry Supply Co., The 2, 202
Federated Metals Div., American Smelting & Refining Co. 38
Fisher Furnace Div., Lindberg Engineering Co. 13
Fordath Engineering Co., Ltd., The 249
Ford Motor Co. 251
Foundry Equipment Co., The 41
Foxboro Co., The 28
Freeman Supply Co., The 22
Fremont Flask Co., The 225
Fuller Co. 224

G

Gardner-Denver Co. 12
General Electric Co. 239
General Foundry Service Corp. 238
Giffels & Vallet, Inc. 158
Globe Steel Abrasive Co., The 27
Great Lakes Foundry Sand Co. 124
Great Western Mfg. Co. 169
Greene Electric Furnace Co. 252

H

Harbison-Walker Refractories Co. 131
Hauck Mfg. Co. 252
Hercules Powder Co., Inc. 43
Herman Pneumatic Machine Co. 183
Hewitt-Robbins Inc. 101
Hickman, Williams & Co. 254
Hines Flask Co., The 34, 35
Hough, Frank G., Co., The 25
Houghton, E. F., & Co. 251
Humphrey, C. S., Co. 258
Hunt, C. B., & Son, Inc. 247
Hydro-Blast Corp. 145

I

Illinois Clay Products Co. 204
Imperial Belting Co. 232
Industrial Equipment Co. 221
Industrial Fabricating, Inc. 229
International Molding Machine Co. 117
International Nickel Co., Inc., The 1, 240
Ironton Fire Brick Co., The 46

J

Jeffrey Mfg. Co., The 54
Johns-Manville 205
Joy Mfg. Co. 61

K

Keokuk Electro-Metals Co. 155
Kirk & Blum Mfg. Co., The 278
Krause, Chas. A., Milling Co. 103
Kux Machine Co. 62

Continued on page 280

ADVERTISING INDEX

L

Lanly Co., The 234
Lindberg Engineering Co. 13
Linde Air Products Co., The 17
Link-Belt Co. ..... Back Cover
Logan Co. 129
Logan Engineering Co. 249

M

Marshall, L. H., Co. 208
Master Pneumatic Tool Co., Inc., The ... 252
Mathieson Chemical Corp. Inside Front Cover
Maughlin, H. P., Co., The 250
Meech Foundry, Inc., The 257
Metal Blast Inc. 111
Metallizing Co. of America 26
Miller, Herbert F., ... 252
Miller-Taylor Tool Co. 250
Milwaukee Chaplet & Mfg. Co. 196
Milwaukee Foundry Equipment Co. 37
Mine Safety Appliances Co. 247
Minnesota Mining & Mfg. Co. 58
Modern Equipment Co. ...Front Cover, 282
Molybdenum Corp. of America 59
Monk Tool Co., The 258
Multiplex Machinery Corp. 239
Murphy, Jas. A., & Co. 244, 248

N

National Engineering Co. 143
National Metal Abrasive Co. 254
National Pigment Co. 48, 49
Neff & Fry Co., The 244
Newaygo Engineering Co. 29
Nicholls, Wm. H., Co., Inc. 32
Norton Co. 30, 31, 126, 127, 134, 167

O

Ohio Electric Mfg. Co., The 99
Oliver Machinery Co. 240
Osborn Mfg. Co., The 136, 137

P

Pacific Graphite Co., Inc. 256
Pangborn Corp. 6, 7, 197
Parsons Engineering Corp. 256
Penn Iron Works 240
Pickands Mather & Co. 63
Pittsburgh Crushed Steel Co. 198
Pittsburgh Metals Purifying Co. 104
Plaster Process Castings Co. 256
Producers Core Sand Corp. 254
Putnam, A. H., Co. 256
Pyrometer Instrument Co., The 253

R

Radium Chemical Co., Inc. 248
Reading Chain & Block Corp. 234
Redford Iron & Equipment Co. 223
Richmond Glove Corp. 254
Rietz Lumber Co. 238
Robeson Process Co. 246
Robins Conveyors Div., Hewitt-Robins Inc. 101
Robinson Clay Product Co., The 56
Roots-Connersville Blower Corp. 186
Rose Truck & Caster Co. 235
Royer Foundry & Machine Co. 97
Royersford Foundry & Machine Co. 258

S

Sather Mfg. Co., Inc. 254
Schmieg Industries Inc. 191
Schneible, Claude B., Co. 50
Schramm Inc. 168
Scientific Cast Products Corp., The 230
Semet-Solvay Div., Allied Chemical & Dye Corp. 231
Silent Hoist & Crane Co. 228
Simplicity Engineering Co. 20
Sly, W. W., Mfg. Co., The 147
Smillie, C. M., & Co. 245
Smith Oil & Refining Co. 219
Smith, Werner G., Co., The 4, 5
Smooth-On Mfg. Co. 248
Solvay Sales Div., Allied Chemical & Dye Corp. 173
Sonken-Galamba Corp. 209
SPO, Inc. 57
Standard Silica Corp. 258
Standard Stoker Co., Inc., The 193
Stearns Magnetic Mfg. Co. 212
Steel City Testing Machines, Inc. 233
Steel Shot & Grit Co. 198
Sterling Wheelbarrow Co. 64, 235
Stevens, Frederic B., Inc. ..Inside Back Cover
Stroman Furnace & Engineering Co. 53
Swindell-Dressler Corp. 19
Syntron Co. 233

T

Tabor Mfg. Co. The 51
Tamms Industries, Inc. 236
Taylor, S. G., Chain Co. 243
Tennessee Products & Chemical Corp. ... 149
Toledo Matchplate Co. 256
Truscon Steel Co. 23

U

Union Carbide & Carbon Corp. 17, 36
United Compound Co. 245
United States Electrical Tool Co., The 60
United States Graphite Co., The 177
United States Steel Corp. 255
United States Steel Corp., Subsidiaries .. 255
United States Steel Export Co. 255
Universal Engineering Co. 47

V

Vanadium Corp. of America 141
Van Products Co. 256
Velsicol Corp. 10
Vonnegut Moulder Corp. 243

W

Webb, Jervis B., Co. 184
Wellman Bronze & Aluminum Co. 246
Wellman Engineering Co., The 258
Westover Engineers 228
Wheland Co., The 241
Whiting Corp. 45
Willson Products, Inc. 216
Woodward Iron Co. 52

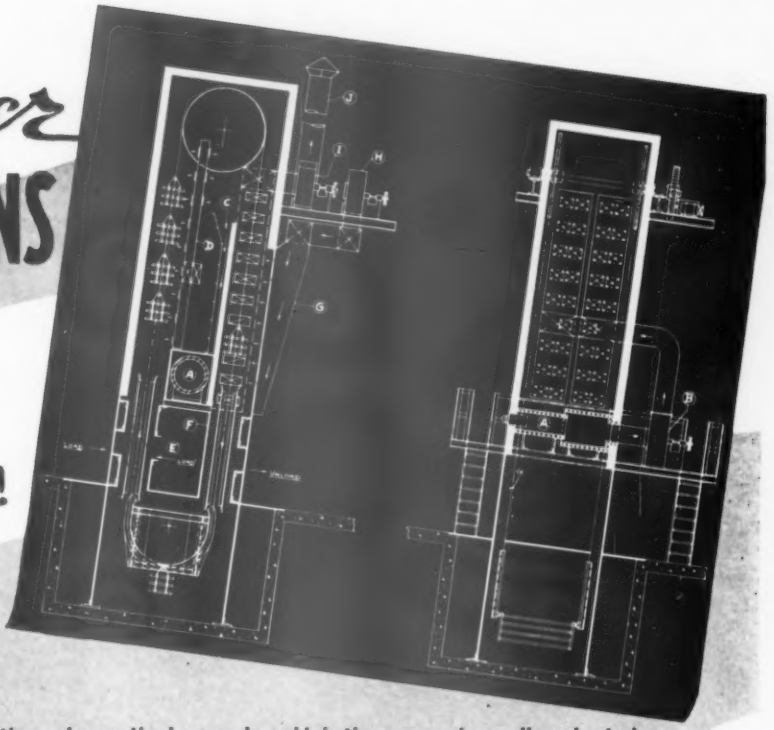
Table of Contents page 3

Classified advertisers, 272, 273, 274, 275, 276

Carl-Mayer VERTICAL CORE OVENS

PATENT NO. 2,257,180

THE MOST MODERN, FINEST, MOST EFFICIENT VERTICAL OVENS BUILT!



This is the only vertical oven in which the new universally adopted recirculating heating system, with completely sealed combustion chamber, may be located between the conveyor chains. Patent No. 2, 257, 180.

Typical Users of CARL-MAYER VERTICAL OVENS

Aluminum Co. of America
Burt Foundry Co.
Cadillac Motor Co.
Eclipse Aviation Corp.
Electric Autolite Co.
Ford Motor Co.
Fremont Foundry Co.
General Motors Corp.
General Steel Castings Co.
Harrison Radiator Co.
Henry Kaiser
H. B. Salter Co.
McKinnon Industries
Quality Castings Co.
Packard Motor Co.
Richmond Radiator Co.
Union Brass and Metals Mfg. Co.
West Michigan Steel Castings Co.

Many Reasons for CARL-MAYER Superiority:

Because of the following features in the Carl-Mayer Vertical Core Oven, outstanding results are guaranteed—FASTER BAKING, LOWER FUEL CONSUMPTION, SMALLER CORE LOSSES, SAFER OPERATION, ELIMINATION OF SMOKE, COOLED CORES AT UNLOADING STATION, REDUCED LABOR COSTS.

- The completely sealed combustion chamber (A) prevents hot combustion gases (1,200° or over) from going directly into the oven chamber, *preventing non-uniform temperatures and burned cores.*
- The combustion chamber (A) located between conveyor strands, *saves space* as compared with vertical oven designs locating the heater external to the oven.
- The external heat fan (B) takes the heated air from the combustion chamber and after tempering with fresh and recirculated air from duct (C) delivers it to the vertical plenum chamber (D). Result: *fast, uniform circulation of heated air—faster baking.*
- Plenum chamber (D) is arranged to insure uniform cross flow of heated air over each passing carrier shelf, resulting in uniform flow of heated air across cores. Result: *uniform fast baking.*
- The "Thru-Passage" (E) properly designed is an old practice used in ceramic drying, and has long proved its efficiency in similar drying procedures. *Permits loading from inside as well as outside.*
- Arrangement of "Thru-Passage" designed by Carl-Mayer (patents applied for) with partition (F) facilitates loading from both inside and outside of oven *but* limits the *unloading* to one side. This is a proven forward step, permitting adequate and fast unloading without the temptation to unload from the inside as well, with its resultant interference with loaders and danger of damaged cores.
- Cooling duct (G) and cooling fan (H) designed according to oven height and loading conditions, assure a uniform flow of cooling air across the cores on the down side to obtain *maximum cooling.*
- Cooling exhaust system, with cooling exhaust fan (I) and collector ducts, *assures prompt and safe removal of combined cooling and exhaust products and smoke from the baked cores.*
- Inspirator type oven exhaust stack (J) utilizes the spent work of the cooling exhaust fan to further remove fumes and to *prevent pocketing of any explosive gases.*

CORE OVENS, MOLD OVENS -- *all types*

THE CARL-MAYER CORPORATION
3030 Euclid Ave., CLEVELAND, OHIO

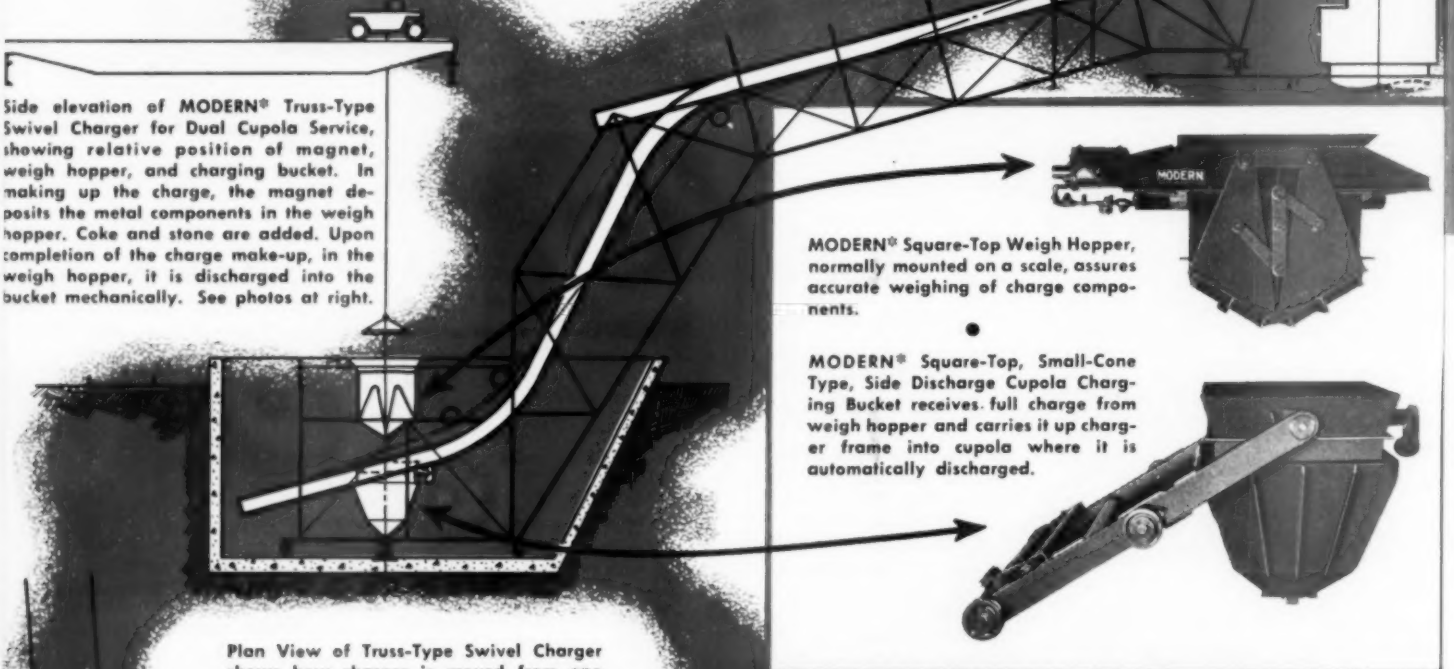
Backed by Over 30 Years' Experience

Engineered by MODERN* for Fast, Efficient Cupola Charging!

The photograph on the front cover of this magazine is a general view of the MODERN* Truss-Type, Swivel Cupola Charger, Custom Built and Individually Engineered for the Production Foundries Division, Jackson Industries, Inc., Birmingham, Ala. On this page are photos of some of the units of this assembly, and simplified drawings of the charger construction.

The MODERN* Representative in your area can arrange for Experienced Engineering Counsel to help you MODERN-IZE your Cupola Charging Operations. Write for Catalog 147-A and Bulletin CC8-49.

MODERN* Square-Top, Cone Type, Side Discharge Bucket inside of cupola at moment of charge release. Its small center-cone and side discharge doors produce an even charge in the stack, with loose center and compact sides. Users report higher melting rates and "better metal".

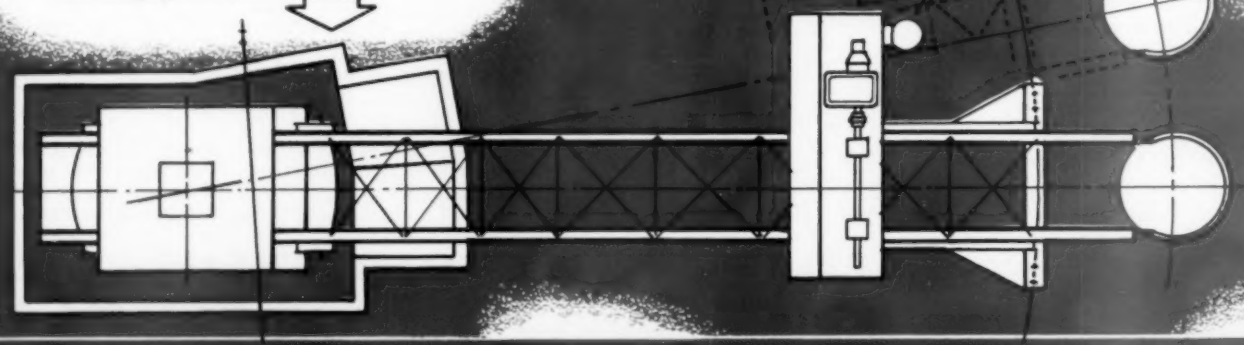


Side elevation of MODERN* Truss-Type Swivel Charger for Dual Cupola Service, showing relative position of magnet, weigh hopper, and charging bucket. In making up the charge, the magnet deposits the metal components in the weigh hopper. Coke and stone are added. Upon completion of the charge make-up, in the weigh hopper, it is discharged into the bucket mechanically. See photos at right.

MODERN* Square-Top Weigh Hopper, normally mounted on a scale, assures accurate weighing of charge components.

MODERN* Square-Top, Small-Cone Type, Side Discharge Cupola Charging Bucket receives full charge from weigh hopper and carries it up charger frame into cupola where it is automatically discharged.

Plan View of Truss-Type Swivel Charger shows how charger is moved from one cupola to the other on alternate days. Charger frame is mounted on a swivel base below weigh hopper, and on a truck which rolls on a curved track segment at the charging-door level.



MODERN EQUIPMENT CO.

PORT WASHINGTON, WISCONSIN

CUPOLAS • CUPOLA CHARGERS • LADLES OF ALL TYPES • POURING DEVICES • METAL POURING SYSTEMS • CRANE AND MONORAIL SYSTEMS • ELECTRIC CRANES.

For More Than Half a Century
Most Valuable to Foundrymen for the Production of Highest Quality Castings

JUST as a diamond, which in its rough state is a crystalline form of pure carbon, must be cut, polished and faceted to produce a flawless stone, another crude form of pure crystalline carbon known as Ceylon (East India) Graphite, must be ground, processed and blended into specific grades of Stevens Plumbago to help you produce flawless castings.

If the nature of your work demands that you turn out flawless castings of finest finish, by all means don't overlook the Stevens Ceylon (East India) Plumbago collection of mold facings. You'll find each a "gem" in its own right.

Most prized of all, is a grade known as No. 90 (containing 90% or more pure graphitic carbon) having extremely high heat resistant qualities. Under the most severe conditions involving metal temperature and casting section thickness, it produces an unbelievably smooth, beautiful casting finish with excellent color.

In addition, there are other fine quality grades of Stevens Plumbago based on the incomparable Ceylon (East India) Graphite. These are blends of several graphites having specific characteristics which meet *every* mold facing requirement—for either dry or wet application.

Describe *your* plumbago needs in detail. We'll gladly recommend and send you a working sample of the grade of Stevens Plumbago best suited to *your* particular requirements.

SINCE 1882 — EVERYTHING FOR A FOUNDRY

LEADING MANUFACTURERS AND DISTRIBUTORS OF FOUNDRY FACINGS, EQUIPMENT AND SUPPLI

FREDERIC B. Stevens INCORPORATED

DETROIT 16, MICHIGAN

Branches • Sales Offices • BUFFALO • NEW HAVEN • INDIANAPOLIS • CLEVELAND

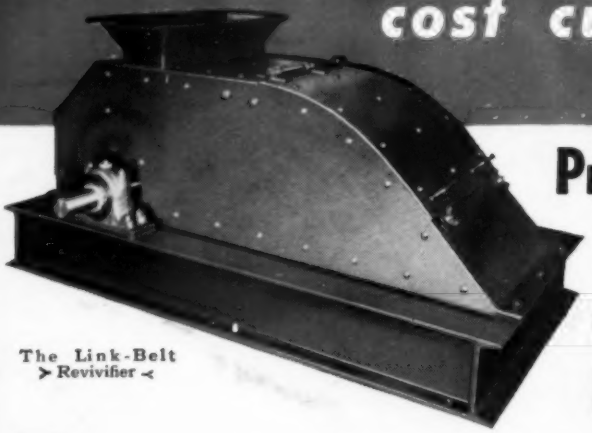
Representatives in Principal Cities

FREDERIC B. STEVENS OF CANADA, LTD. WINDSOR, TORONTO, ONTARIO

FOUNDRY EQUIPMENT AND SUPPLIES DIVISIO

LINK-BELT *SEP*-AERATORS and REVIVIFIERS—*Sand preparation cost cutters*

Link-Belt sand ➤Revivifier➤ installation in large foundry.



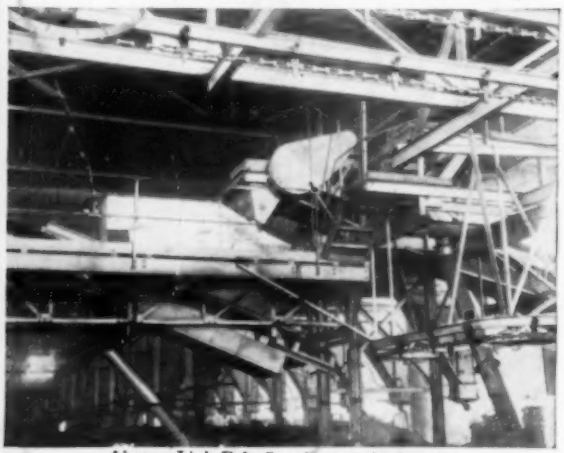
The Link-Belt ➤Revivifier➤

Produce uniform Fluffy sand with the Right "Feel"

THE MODERN, streamlined Link-Belt ➤Revivifier➤ effectively fluffs and cools foundry molding sand—producing a uniform, aerated and flowable sand with the right "feel"—sand that will ram to uniform density in the mold. Made in four sizes for maximum capacities of from 25 to 150 tons an hour.

A supplementary unit, the Link-Belt Sep-Aerator, is particularly adapted to non-ferrous foundries where it is not possible to remove metallic shot by magnetic means. It not only does a thorough aerating and mixing job, but also separates metallic shot, pebbles and small refuse. A high capacity unit, ideally suited for continuous systems.

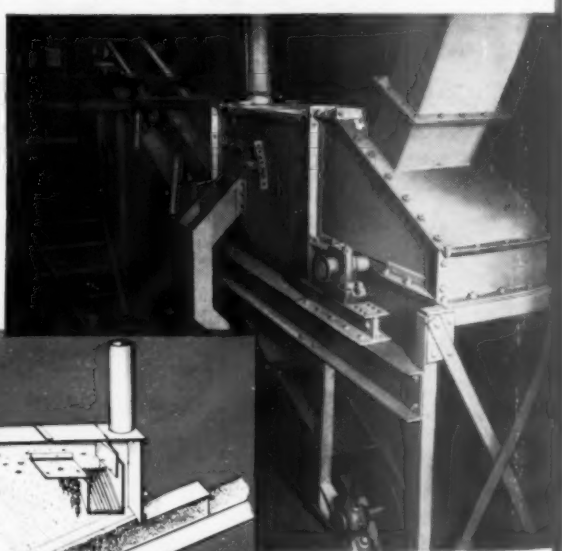
Let us give you detailed information on the Link-Belt ➤Revivifier➤ and Sep-Aerator.

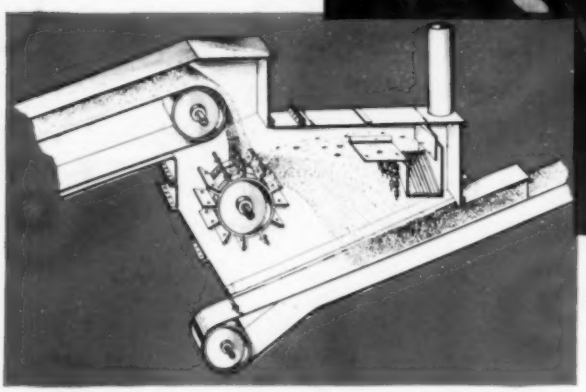


Above: Link-Belt Sep-Aerator in foundry.

Below: Link-Belt ➤Revivifier➤ and other equipment in Southern foundry.

11,031





At left and above are illustrated the Sep-Aerator, showing principle of operation.

THE SYMBOL OF QUALITY LB LINK-BELT

LINK-BELT COMPANY Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Dallas 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8. Offices in Principal Cities.

MANUFACTURER'S ASSOCIATION, INC. FOUNDRY EQUIPMENT

LINK-BELT CONVEYORS AND PREPARATION MACHINERY